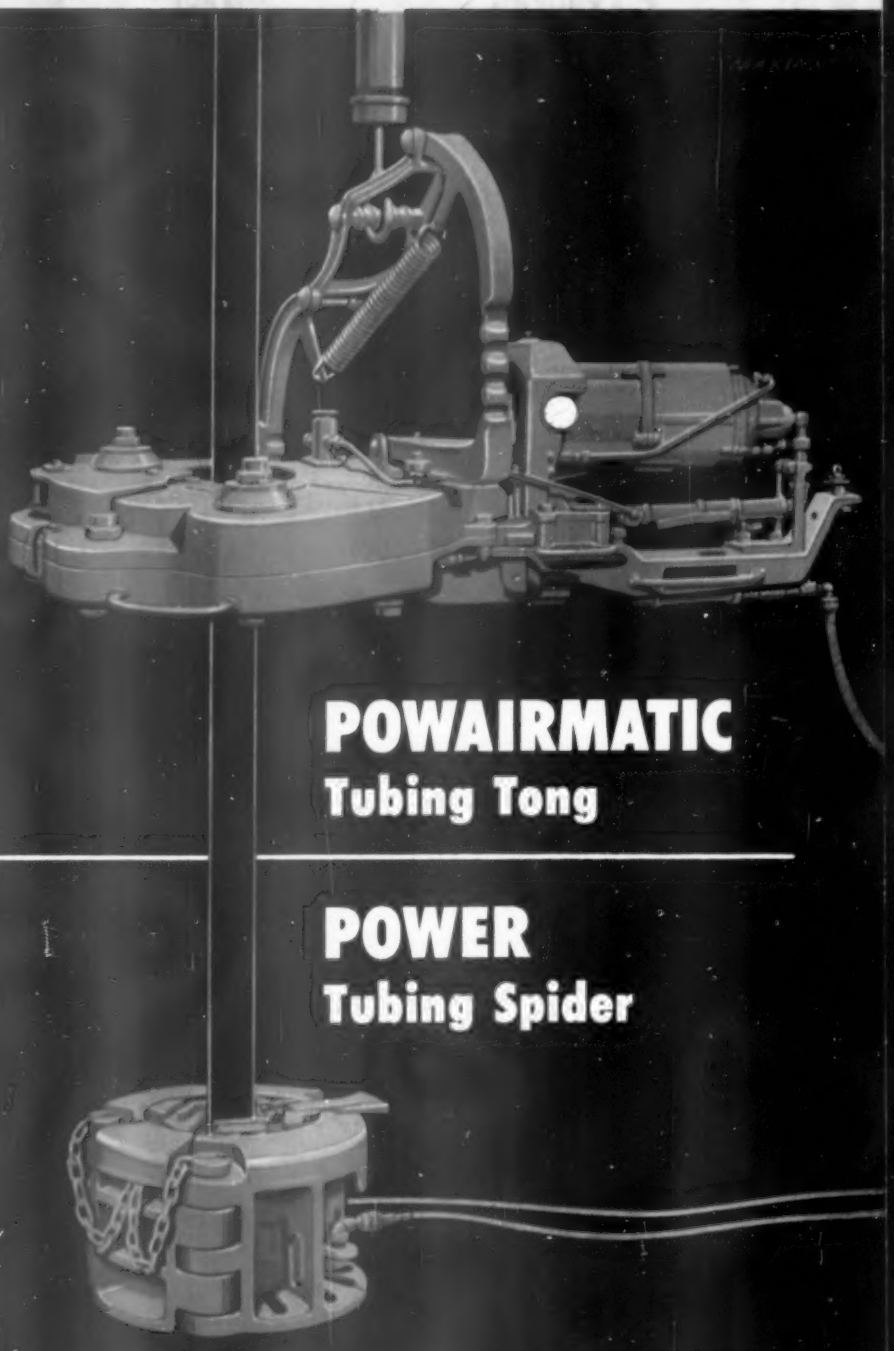
the OIL AND GAS JOURNAL

put POWER on your production work ...and SAVE!



BJ

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Tools of our Trade No. 7

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 OCTOBER 18, 1954

Lane-Wells 95 branches in the United States, Canada and Venezuela are so strategically located that you're assured fast, dependable perforating service in every active oil area. Tell your nearest branch when you want them, and they'll be there, right on the dot, with modern, powerful equipment to do your job the way it should be done. And the crew that comes with it knows how to do the job, too, not only because they're backed by the experience gained in more than two hundred thousand perforating jobs, but because they really know local conditions—*your* conditions and problems. All of this adds up to one thing: doing your perforating *right!*

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the OIL AND GAS JOURNAL

OCTOBER 18, 1954 VOL. 53 NO. 24

OIL IN THE NEWS . . .

Offshore-Leasing Records Tumble in Louisiana Sale . . . 70
Survey Shows There's Less Gas Being Sold to Pipelines . . . 72
Phillips Chairman Predicts Gas Supplies Will Diminish . . . 73
Contractors Told to Improve Communications With Operators . . . 74
Yardstick for Estimating Drill-String Wear Given A.A.O.D.C. . . . 74
Dunbar Elected President of A.A.O.D.C. . . . 75
Transco Overcomes Obstacles in Laying 36-In. Pipe . . . 76
Wallace Pratt to Receive 1954 A.P.I. Gold Medal . . . 78
Microwave Users Reorganize New Operating Council . . . 78
Ellenburger Discoveries Keep West Texas Activities High . . . 79
Corrosion Controls Outlined at Regional N.A.C.E. Meeting . . . 80
Revision of Gas Cycling in Portions of La Gloria Field Sought . . . 81
Texas Gulf Expected to Finish Headlee Field Gasoline Plant Soon . . . 81
Cradle That Increases Depth Range of Barges Developed . . . 82
Oklahoma's Grady County Has 70 Rigs, Is Second Most Active . . . 83
New Discovery Allowable Adopted by Oklahoma Stresses Depth . . . 84
More Out-of-State Gas to Be Needed by California . . . 85
Oil Industry Asked to Submit Views on National Fuels Policy . . . 86
Repressuring Plan Under Study for Colorado's Adena Field . . . 87
Americans Control 36.5 Per Cent of World Refining Capacity . . . 89

TECHNOLOGY AND OPERATION . . .

[1]Hydrofining's Use in Product Improvement—A. C. Patterson and M. C. K. Jones . . . 92
Engineers Ponder Oil-Production Problems—A.I.M.E. Abstracts . . . 95
[2]Pure Oil Operates Model-B Orthoflow Cat Unit—George Weber . . . 99
[3]Fracture Packing Cures Sand Headache—John D. Forsythe . . . 101
Use Correct Productivity Index for Gas Lift—C. V. Kirkpatrick . . . 103
Can Your Wells Produce Allowables?—W. B. Pardoe . . . 105
[4]Plan for Valve Maintenance and Testing—P. L. Hughen . . . 107
Nonexplosionproof Motor in Hazardous Area—H. M. Martin . . . 111
Drilling Rigs Need Bridge—C. F. Hamlin . . . 112
[5]Spencer Chemical Speeds Plant Construction—F. L. Resen . . . 114
On the Job . . . In the Plants . . . 117
Engineering Reference Section . . . 121-131

EXPLORATION . . .

Mystery in Carter County . . . 165
Shallow Pay Spurs Osage Drilling . . . 166

NEWS FEATURES . . .

They Say . . . 56
Calendar of Events . . . 60
Journally Speaking . . . 65
Editorial . . . 67
This Week . . . 69
Watching Washington . . . 79
International News . . . 88
Refining News . . . 132
Personals . . . 197
Deaths in the Industry . . . 200
Statistical Summary . . . 202
Drilling Statistics . . . 203
Supply Statistics . . . 204
Refining Statistics . . . 205
Demand Statistics . . . 206

DEPARTMENTS . . .

Books . . . 104
Engineering Fundamentals . . . 121-123
Field Processing . . . 125
Questions on Technology . . . 127
Equipment Design and Operation . . . 129-210
Pipeline Patrol-Construction . . . 139
Equipment Digest . . . 149
Trade Literature . . . 153
Equipment Men in News . . . 157
Classified Advertising . . . 207
Advertisers' Index . . . 211

FIELDS . . .

Drilling Contractors . . . 135
Area Field Reports . . . 168

In Brief . . .

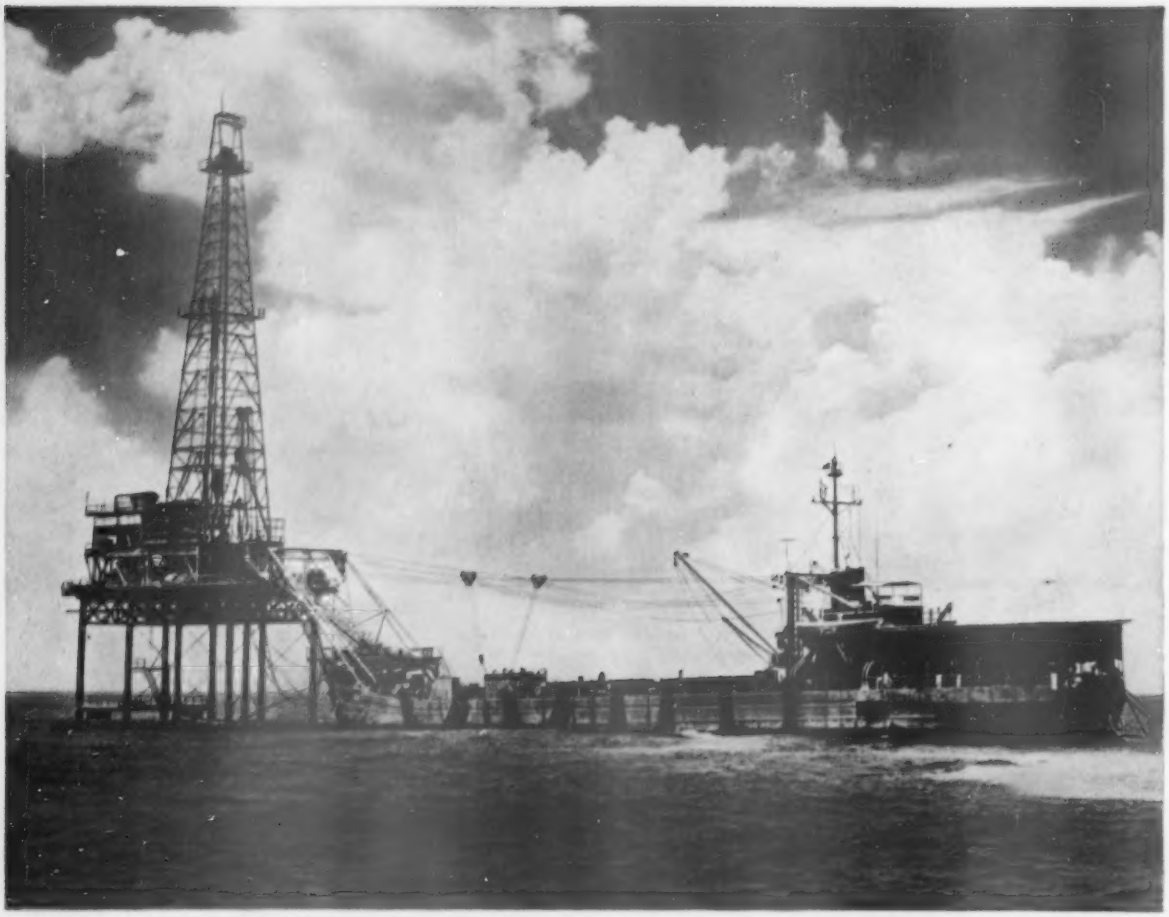
1. VERSATILE PROCESS . . . There are currently seven hydrofining units operating with combined capacity of over 55,000 bbl. per day. A dozen additional units are planned or are under construction. Process improves stability, odor, color, and burning characteristics, and removes sulfur and other corrosive materials such as oxygen and nitrogen.

2. NEW CRACKER DESIGN . . . The first commercial unit of the new Model-B Orthoflow fluid catalytic process has operated for 9 months in Pure's Toledo refinery. Unit has been fully incorporated into refinery operation with consequent improvement of gasoline yield and quality. In Model-B arrangement, regenerator is positioned directly over the reactor. Net result is a marked reduction in operating cost.

3. HEADACHE CURED . . . A combination of sand fracture and pressure gravel pack will provide sand control and reduce the number of workovers on a given well where sand is a problem. Procedure has been successfully tested in the Cities Service Oil Co.'s Barngrover lease in Hull field, Liberty County, Texas. Lease oil of 34° A.P.I. gravity was used as carrier. Extensive fracturing is not necessary. Bradenhead squeeze method can ordinarily be used for placement of casing sand.

4. IMPROVED OPERATION . . . Texas Eastern's experience with power-operated valves and emergency shutdown systems indicates proper positive operation can be assured only with good inspection, thorough maintenance, and complete periodic testing of the equipment. Definite schedules are set up for periodic maintenance of valves and other equipment. A valve control inspector is assigned to each division of the company with primary responsibility for carrying out the maintenance program.

5. FAST CONSTRUCTION . . . Elaborate preplanning of location, engineering, purchasing, and construction methods lies behind the excellent construction record of the Spencer Chemical Co.'s polyethylene plant now being built at Orange, Tex. Spencer's scheme requires numerous conferences between personnel of the construction company, project engineers, and representatives of Spencer's management. Four master-control outlines greatly assist planning and purchasing.



Oil and mud in 11 fathoms of water

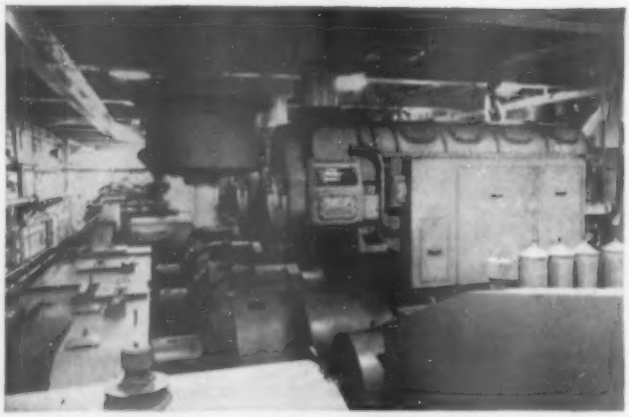
Out on Rig Ten, the deepest water drilling site yet attempted in the Tidelands, the greatest single power requirement is that of the mud pumps.

That power—2250 horsepower—is supplied by three compact Fairbanks-Morse Opposed-Piston Diesels. They drive three 800-horsepower pumps that force a jet of mud with such velocity that it actually produces a part of the drilling action.

Located in the machinery hold of the Gulf Oil Corporation's tender, The *Eagle*, these three O-P engines make a compact installation—providing more horsepower per foot of floor space.

Simple Opposed-Piston, 2-cycle design eliminates more than 40% of the moving parts found in comparable engines. Fewer parts to wear—maintain—replace. That means greater dependability and lower maintenance.

Ask your nearby Fairbanks-Morse Oil Field Specialist for the complete story of Opposed-Piston Power in drilling and pumping service. There's a model for all classes of power between 320 to 2400 horsepower. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois.



The 2250-horsepower Opposed-Piston installation that meets the highest power requirements on the off-shore drilling operation for the Gulf Oil Corporation.

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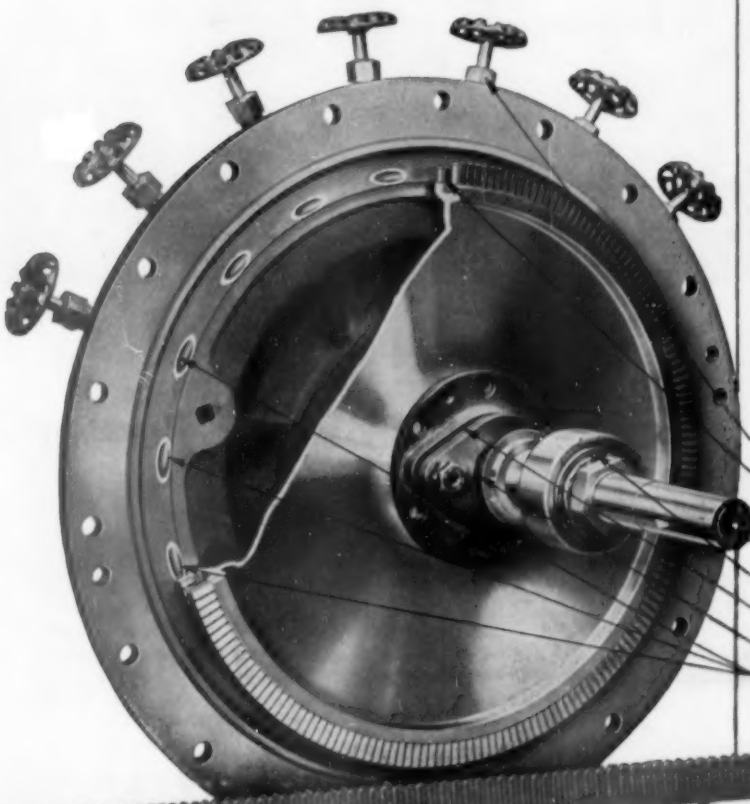
a name worth remembering when you want the best

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.



7 hand valves for efficient partial load operation, (20" turbine shown)

2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced

30-40 carbon steel shaft

Oversized double row deep grooved ball bearing

Stuffing box with metallic packing ring

Heavy chrome plating of shaft through stuffing box

3 nozzles always open

Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORP., 271 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

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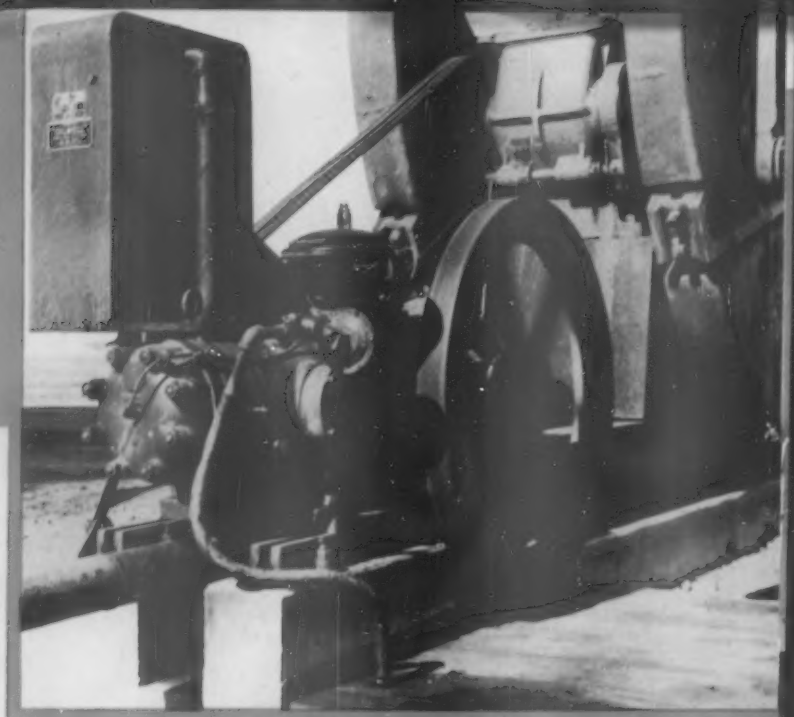
In the 20-70 hp. range...



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Lorain Gas and Diesel Engines

for dependable low cost PUMPING Power

● Winter's cold or summer's heat does not impair the consistently good performance of these heavy-duty two-cycle pumping engines.

Their slow-speed design enables them to stay on the job for years without costly repairs and with very little attention.

BRIEF SPECIFICATIONS

	Type L	Type O	Type R	Type A
Bore and Stroke, in.....	7½ x 8	9½ x 10	12 x 13	13 x 13
Displacement, cu. in.....	353	708	1470	1725
Speed Range, rpm.....	300-600	250-500	200-350	200-350
Max. Piston Speed, ft.....	800	833	758	758
Rated Horsepower.....	14-25	24-42	35-59	37-70

Cylinder liner is of the wet type and can be replaced without special tools. Even when repairs are necessary, they can be made right on the lease, without the expense of trucking the engine to a shop.

Lorain engines, as well as maintenance supplies, are available at your nearest "Oilwell" store. Try one on your next heavy-duty pumping job and see for yourself how economical they are to operate.

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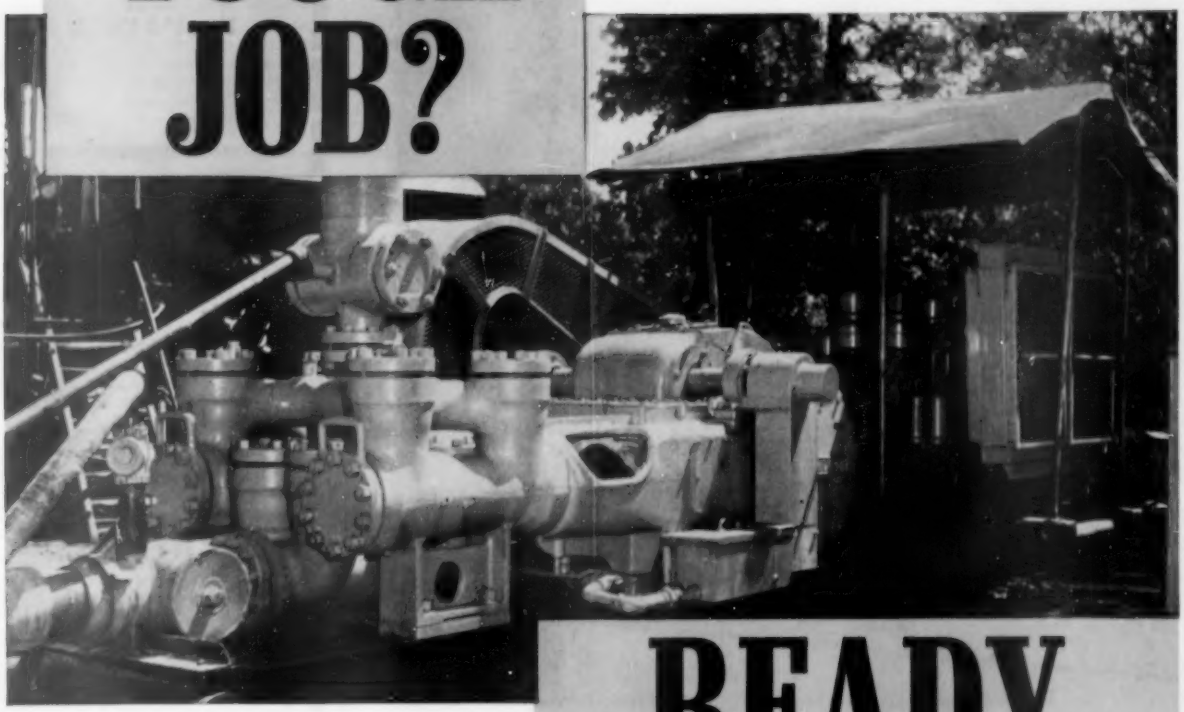
TOUGH JOB?

Bethlehem Supply Co. of Tulsa uses Link-Belt DE Roller Bearings on their No. 225 slush pump.



READY ANSWER:

LINK-BELT self-aligning roller bearings chosen for Bethlehem slush pump

Where shafts must turn freely—day in and day out, rain or shine—you'll find Link-Belt ball and roller bearings on the job. Oil field equipment builders and users alike have learned from experience they can rely on these precision bearings for long life under the toughest conditions. For facts on the broad Link-Belt line of mounted and unmounted bearings, write for Data Book 2550. Or get in touch with the Link-Belt bearing engineer in your field.

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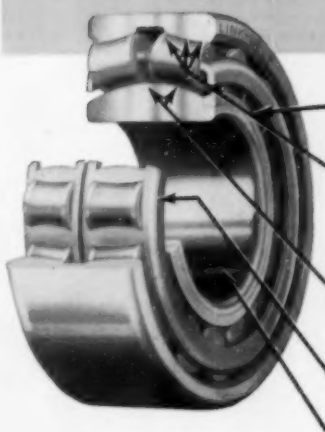
13,450

BALL and ROLLER BEARINGS keep company with America's hardest-working equipment

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 1, Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.



Cutaway of Series DE Self-Aligning Roller Bearing. Link-Belt builds a complete line of mounted bearings: Pillow Blocks, Flanged, Flanged Cartridge, Cartridge, Hanger and Take-Up Blocks.

PROPER CLEARANCE of all parts is built-in, and bearing is locked together as a complete assembly.

NO PINCHING OR BINDING—Symmetrical rollers are naturally positioned by their concave shape, assuring free rolling and eliminating end friction.

INTEGRAL SELF-ALIGNMENT — Angular contact of concave rollers operating between convex raceways. Inner raceway free to align angularly in any direction.

FULL LOAD CAPACITY for radial, thrust or combined radial-thrust loads is assured even with shaft deflection or misalignment.

ROLLERS ARE COMPLETELY POCKETED in hardened steel retainers for accurate spacing and guiding.

STRAIGHT BORE MOUNTING for press fit direct on shafting. Tapered adapter sleeve also available for use with commercial shafting where easy removal and installation of bearings are advantageous.

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Modern design....Accepted for dependability... Certified Safe REALISTICALLY PRICED!

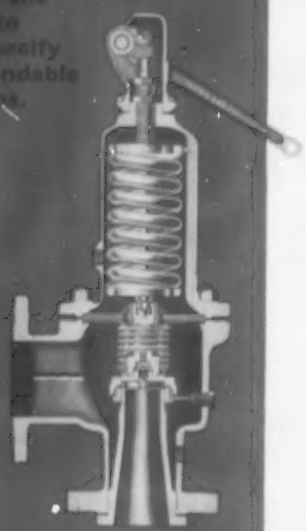
The swing is to Farris . . . whether the service is for liquid or gas, the only way to insure 100% safety all the time is to specify Farris. The world standard for safe, dependable service under all operating conditions.

Eliminate all risk of failure . . . the famous "FarriSeal"* and "BalanSeal"* Bellows, designed to overcome sticking and faulty valve operation, is engineering proof of the most advanced sales technology.

"Hanging" of moving parts is prevented because the bellows seals off the stem, guide and spring . . . protecting them from the corrosive action of the fouling fluid. Regardless of back pressure, the effects of surges or static condition are reduced or eliminated, allowing the valve to blow at the set point.

Bellows available in 316 Stainless or Monel, Kel-F coated if required.

Ask for additional data on this revolutionary, exclusive line of shielded valves.



Farris ENGINEERING CORPORATION

420 COMMERCIAL AVENUE, PALISADES PARK, NEW JERSEY

Affiliates: Farris Flexible Valve Corp. — Farris Silicon Corp.
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Sizes 1" D 1½", to 8" T 10"

SEMI-NOZZLE

Sizes 1½" F 2", to 6" S 8"

BAR STOCK & HI-PRESSURE

Type 2745—½", ¾", 1"
Type 2740—½" x 1", ¾" x 1", 1" x 1", 1" x 1½"
Type 1430—1¼", 1½", 2"

CORROSION TYPES

Type 1000—½" to 2"
Type 3725—½" to 1"
Type 3775—1½" to 2"

GENERAL SERVICES

Sizes ½" to 6" x 8"

REPRESENTATIVES IN U. S. AND CANADA:

TYPE 2680

Made in Series 30, 60, 90 and 150 inlet flanges, R.F. and R.T.J. Series 15 outlet standard. Available with "FarriSeal" or "BalanSeal" bellows—with or without internal heat exchanger coil; stainless steel, Monel and Hastelloy trim. Plain or packed cap, and open lever types.

TYPE 2610

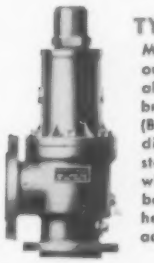
Made in Series 15 and 30 inlet flanges. Series 15 outlet standard. Parts interchangeable with heavy series valves. Full capacity, economical, for medium pressure range.

TYPES 2575 to 2578— Series A, B, C

A.S.M.E.—N.B. Steam Generator Safety Valve. Complies with A.S.M.E. Code for fired pressure vessels. The suffix A indicates maximum temperature of 650°. B indicates 750°, using alloy spring; C indicates 900°, using alloy spring and carbon-moly. body. Pressure limits:

2575—300# 2576—450#
2577—600# 2578—900#

These valves are famous for their non-sticking qualities. Available in oversize orifices for greater capacity at slight additional charge.



TYPE 2550

Made in Series 250 inlet, 125 outlet. Female outlet size available up to 4". Iron body, bronze or stainless steel trim. (Bronze trim has stainless steel disc as standard.) Stainless steel trimmed valves available with "FarriSeal" or "BalanSeal" bellows, with or without internal heat exchanger coil. Capacity advantages of full nozzle design

TYPE 2250

A.S.M.E.—N.B. Exposed Spring Boiler Safety Valve. 250# inlet, 125# female outlet to 4". Pressure and temperature limits 250# at 450°F. Available in stainless steel or bronze trim. Stainless disc on bronze trim, standard.

TYPES 2570 & 2550 - OL

Made in Series 250 inlet, 125 outlet. Female outlet size available up to 4". Iron body, bronze or stainless steel trim. (Bronze trim has stainless steel disc as standard.) Stainless steel trimmed valves available with "FarriSeal" or "BalanSeal" bellows, with or without internal heat exchanger coil. Capacity advantages of full nozzle design. Type 2550 - OL—Open Lever Construction; Type 2570—Packed Cap and Lever Construction.

TYPE 2745

Sizes ⅛", ¼" orifice No. 8 (area .019), No. 13 (area .077). 1" orifice No. 12 (area .045), No. 20 (area .250). By far the most outstanding advance in Safety Valve achievement. Nozzle capacity, blow down ring control, self aligning loose disc construction. Made from forged bar stock in four materials: brass, 304 and 316 stainless steel and cold rolled steel. Internal trim, 316 stainless steel. Both pipe connections in body for economical maintenance suitable for pressures to 10,000# on air, gas, oil and water. Type 2747—Packed Cap and Lever Construction.

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⅛" x 1", ¼" x 1" with .049 area, 1" x 1" and 1" x 1½" with .18 area. A rugged, simplified design, limited capacity Safety-Relief Valve. Used by refineries particularly where extreme accuracy of blow-down is not essential. Uses: thermal reliefs, pump by-passes, etc.

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Sizes 1¼", 1½", 2" female inlet and outlet. Heavy duty Safety-Relief Valve, cast steel body, stainless steel trim, with flat seat and disc and blow-down ring for pressures up to 600#. Both pipe connections in body for economical maintenance. For gas or liquid service.

TYPE 1000

Diaphragm Control Relief Valve, sizes ½" to 2" male inlet, female outlet on bronze, 15 series inlet, 15 series outlet on Hastelloy "C" and type 316 stainless steel. Sensitive control with minimum bleed down. For chemical vapor-tight service—liquid or gas. Available with rubber, Neoprene, or molded Kel-F diaphragm and disc.

TYPE 3725

½" and ¾" orifice No. 13 (area .077). 1" orifice No. 20 (area .25). Made in female connections or Series 15, 30 or 60 flanges inlet. With rubber, Neoprene, or stainless steel "FarriSeal" bellows, Hastelloy "C" or 316 stainless steel body and disc. For highly corrosive acid services within the scope of 316 stainless steel and Hastelloy "C".

TYPE 3775

Sizes 1½" to 2", H orifice (area .785). Series 15, 30 or 60 inlet. Series 15 outlet. Rubber, Neoprene or 316 stainless steel "FarriSeal" bellows. Hastelloy "C" or 316 stainless steel body and disc. For highly corrosive acid services within the scope of 316 stainless steel and Hastelloy "C".

TYPE 1808

Sizes ½" to 2½". All Bronze Portable Pop Safety Valve. Male inlet, female outlet. A.S.M.E.—N.B. for steam or air services. Precise operation, economical first cost. Pressure to 250# steam.

TYPE 1400

Sizes ½" to 2½". Low Pressure Liquid Relief Valve, all bronze. Compact, adjustable range. Can be inspected and serviced without breaking pipe connection. Pressures to 250#.

TYPE 2350

Sizes 1½" x 2" to 6" x 8". Wing guided construction cast iron body, bronze trim. A.S.M.E. — N.B. Boiler Safety Valve, exposed spring, test lever. 250# inlet, 125# or female outlet to 4"

TYPE 2469

Sizes 1½" x 2" to 6" x 8". Wing guided construction, enclosed spring, test lever. A.S.M.E. — N.B. Cast iron body, bronze trim, 250# inlet, 125# or female outlet to 4".

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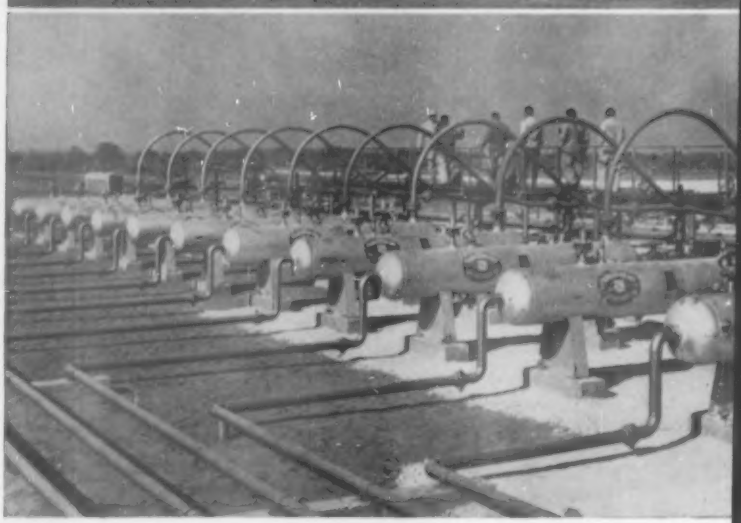
Whether it's Vertical or Horizontal...



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Whatever your oil and gas separating conditions, you can select a Parkersburg Separator, fully confident that it will do the job required. Parkersburg's know-how, experience and engineering skill . . . the unlimited range of separator types and sizes . . . the availability of special units is practical assurance that you don't have to compromise service and performance even under the most unusual conditions.

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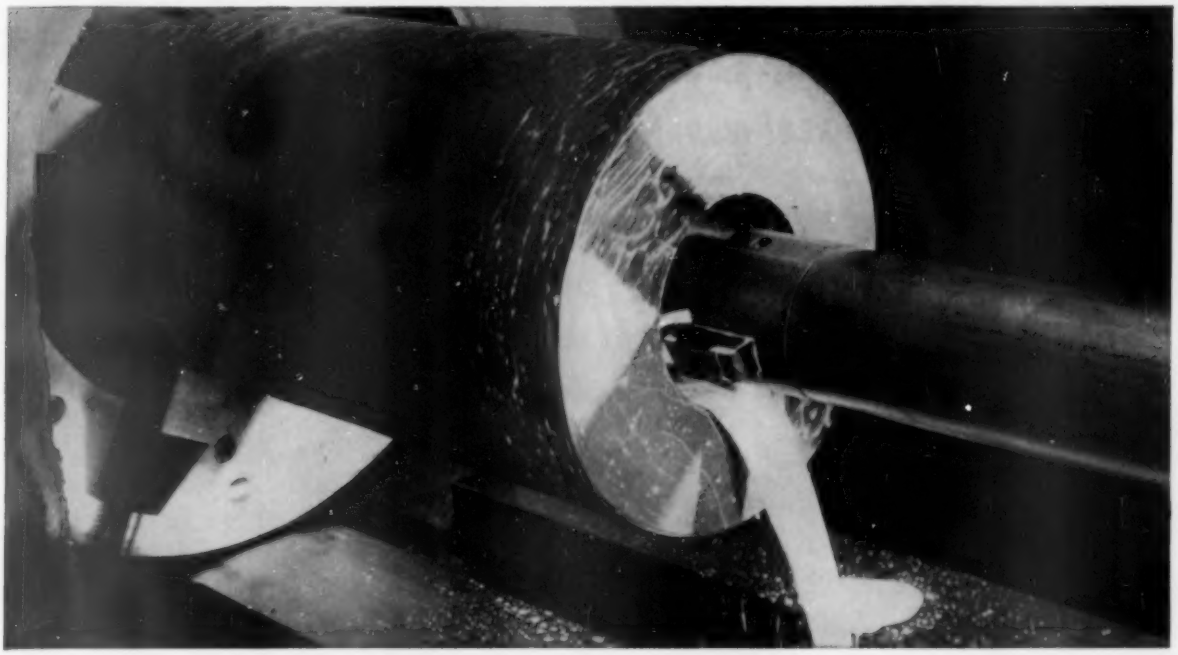
SEPARATORS • HYRECO • DEHYDRATORS • KNOCKOUTS • SCRUBBERS • TREATERS • HEATERS

START WITH FINISH BORING!



TIMKEN® seamless steel tubing saves steel, machining time!

FINISH boring is your first production step when you use Timken® seamless steel tubing instead of bar stock for your hollow parts jobs. You don't have to bore out the center hole. With Timken seamless tubing, it's "built-in"! So screw machine stations are available for other jobs. You add machining capacity without adding machines.

Because the center hole is already there, you also save steel with Timken seamless tubing. There's far less metal to machine away, giving you more parts per ton of steel.

To save you even *more* steel, the Timken Company's engineers will study your problem and recommend the most economical tube size for your hollow parts job—a size guaranteed to clean up to your dimensions.

Timken seamless tubing results in a better quality product, too. The piercing operation by which Timken tubing is made is basically a forging operation. This gives the tubing a uniform spiral grain flow and a refined grain structure that brings out the best in the quality of the metal. And this quality is uniform from tube to tube and heat to heat, due to the Timken Company's rigid quality control. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

In today's high production pattern, when one unit can be made big enough to do the work of two or more smaller units substantial economies result... economies in connecting pipe systems, in duplicate controls and instrumentation, in operating man power.

Don't let equipment manufacturing capacity be a limiting factor

Here's an example of the ability of Stearns-Roger to turn out the "big ones":

Take it up with Stearns-Roger

Still designed and built by Stearns-Roger in its Denver shops for a natural gasoline plant owned by Southern Production Company and Humble Oil & Refining Company in the Pledger Field, 70 miles south of Houston.

One of the largest in the industry, this unit is 12 feet 10 inches in diameter and 124 feet long. It is built of special quality ⅝" steel plate, weight 205,000 pounds.

Shipment on three flatcars was scheduled for daytime travel only at maximum speed of 25 miles per hour, over special routing to obtain sufficient clearance. On sharpest curve enroute, center of Still swung 17 feet away from center axis of middle car.

ENGINEERING
DESIGNING
MANUFACTURE
CONSTRUCTION

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

DENVER • HOUSTON • SALT LAKE CITY • EL PASO

Mr. "B" was in a BIND

When Mr. B. came to see us he was in a bind. He had borrowed on his properties in East Texas to buy some production in Louisiana. Now he discovered that he had a unit which was costing too much to operate. He told us that if he could buy the adjacent property he could work it with no additional equipment and get out of the woods.

We looked into his problem thoroughly, and when he returned we had two proposals to make. We told him we'd lend him enough to buy the new land, so that he would need only $30,000 in cash. But then we asked him if he had ever considered selling his part. We showed him the tax advantages and the excellent cash position it would put him in. He understood what we were telling him, and he sold. He got out from under a bad deal with enough cash to get into a deal which did pay out for him.

We lost the opportunity to make a loan, you say. Yes, but lending is not our only function. In the Oil Loan Department at The National Bank of Commerce we are trying to help and to develop independent oil men. If you have a difficult problem which needs impartial appraisal and advice based on experience, come to see us. This sort of help is why oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi

Series 100 Open Motors are lighter in weight and take up to 30% less space than open motors of old NEMA frame sizes.

Series 100 TEFC Motors have same diameters as the Series 100 Open Motors, for easier interchangeability.

New Howell Series 100 open and TEFC motors have same diameters!

Howell's new re-rated motors save space, are easier to interchange! Feature double-shielded bearings . . . serve your needs better *all* ways.

If space ever limited your use of motors, here's welcome news: Series 100 Open and TEFC Motors have the same diameters! The reason? – Howell's exclusive ventilating system. This system cools *internally* providing 50% more contact between cooling air and active lamination materials. Result: you get motors that meet minimum space requirements . . . that run cooler than established ratings . . . that have increased load capacities – you get improved performance and longer life!

Less maintenance, too! New double-shielded bearings are standard on both the open and TEFC motors. These bearings seal grease in – dirt out. And where operating conditions are severe, you can re-grease them quickly, easily. Actual use proves these double-shielded bearings best for most applications; however, any type can be furnished.

Meet your special needs! New Series 100 Motors provide dependable copper rotors – three diameters for each frame size to assure design flexibility. Special corrosion-resistant materials and fittings are available.

Before you buy any re-rated motor, compare Howell's Series 100 Motors – for modern design, outstanding performance and precision engineering. Howell will continue to make a complete line of regular and special motors–with over 20,000 electrical design specifications to serve you. Call your Howell man today or write for Bulletin N-100!

HOWELL MOTORS

Howell Electric Motors Company, Howell, Michigan

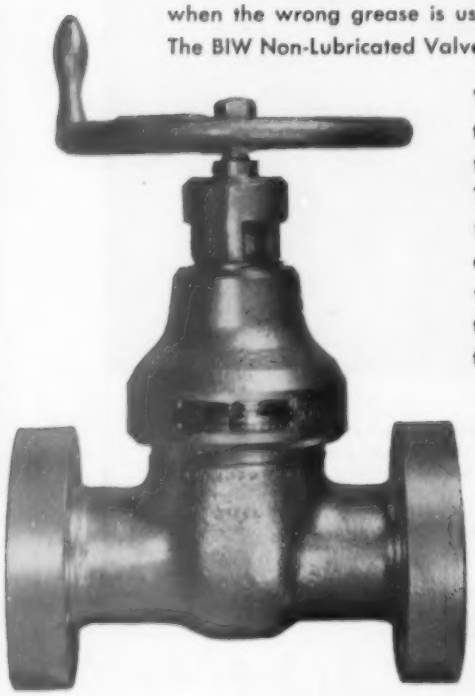
MOTORS FOR INDUSTRY SINCE 1915

WHY PAY TO USE YOUR OWN VALVES?

BIW Non-Lubricated GATE VALVES

CUT VALVE MAINTENANCE COSTS

You needn't dig into your pocket for more money every time you use a BIW Non-Lubricated Gate Valve. You can use these valves free. You are free of the man with the grease gun. Free of an inventory of grease. And free from the problems that come when the wrong grease is used or when greasing is forgotten. The BIW Non-Lubricated Valve makes **economy** a fact.



With the economy of non-lubrication you get the dependability of the simplified, rugged BIW design. The low opening torque required, the effective metal to metal seal, and low maintenance of BIW valves have been proved by more than 35,000 installations in the field.

The BIW Non-Lubricated Gate Valve comes in a full range of sizes and pressures up to 15,000 pounds test pressure! See the BIW engineer today and forget about the problem of lubricating valves.

ALCO

American Locomotive Company

Beaumont Plant—Formerly Beaumont Iron Works Company

Oil Tool Sales Office—1404 Dunlavy—Houston 19, Texas

Oil Tool Warehouses in Beaumont and Odessa

Wagner®
TRANSFORMERS
...the choice of leaders in industry

CHOOSE WAGNER UNIT SUBSTATION TRANSFORMERS

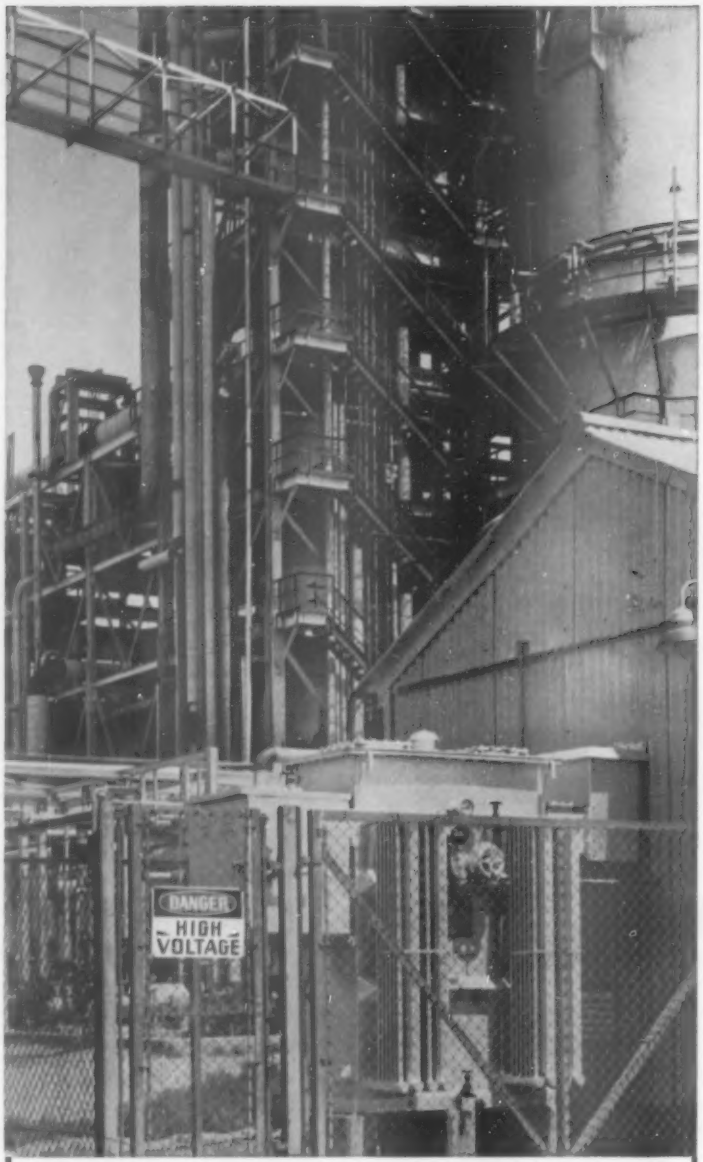
for always dependable power...

Here's dependability at work! This Wagner liquid-filled unit Substation Transformer feeds the catalytic unit at The Carter Oil Company refinery in Billings, Montana.

You'll find hundreds of Wagner Transformers, furnishing *always dependable* power, in spots where failure would incur great cost, because Wagner Transformers are known for their unfailing dependability—a reputation backed by more than sixty years of transformer building experience.

Wagner Unit Substation Transformers, both liquid-filled and dry-type, are carefully designed to meet distribution requirements. Both liquid-filled and dry-type unit substation transformers are built in ratings through 2000 kva, 15 kv and below—you can choose the type and rating that exactly meets your load-center distribution requirements.

Bulletins TU-13 and TU-56 give full information. Your nearby Wagner engineer can help you solve your load-center problems. Call the nearest of our 32 branch offices, or write us.



This 750 kva, 2400/4160Y to 480 volt, 60 cycle, three-phase, liquid-filled Wagner Unit Substation Transformer feeds the catalytic unit at The Carter Oil Company, Billings, Montana refinery. It is throat connected to switchgear in the adjoining building. Purchased and installed by The Fluor Corporation, Ltd., Engineers and Constructors for the Petroleum, Chemical and Power Industries, Los Angeles.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6389 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

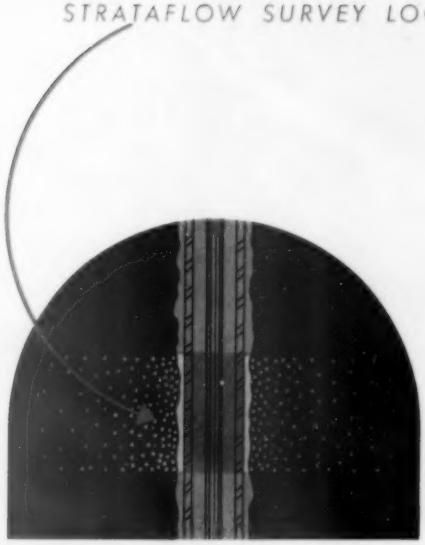
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

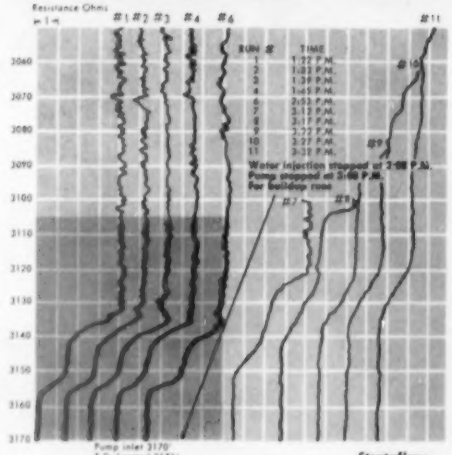
ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE
BRAKE SYSTEMS—
AIR AND HYDRAULIC

T54-3

NOW, log water entry in any pumping well

STRATAFLOW SURVEY LOCATES WATER DURING NORMAL PRODUCTION





Zone	Strataflow interpretation
Above-3,136	No water entry
3,136 – 3,141	Water entry
3,141 – 3,153	Minor entry
3,153 – 3,157	Major water entry
3,157 – TD	No entry

The easy-to-use, easy-to-interpret and accurate Strataflow logging method now makes it possible to pinpoint water entry in any ordinary type of pumping well—regardless of total production rate and the per cent water production. Even those wells completed in limestone or dolomitic formations can be logged as the logical first step in an effective water shut-off program.

By running a Strataflow log while the well is producing normally, you have a more accurate, factual picture of each oil or water producing zone. The well is produced continuously prior to and during the test, except for a brief shut-down for water consolidation. Since the well is at no time likely to approach static equilibrium, there is little danger of low pressure formations being flooded by foreign waters.

The special 1" Strataflow electrode, which measures the varying resistances between a conditioning water pumped into the bore and salty formation waters, can be run in the annulus at an important savings in cost. In wells where no mud anchor is used and where tubing has adequate space for the electrode, there is no need to pull and rerun the tubing and rod strings. Removal of the normal well head seal and lowering of the tubing string to set the pump inlet close to the bottom are the only modifications required.

All these operating advantages make a Strataflow test easier and faster to run—usually about eight to ten working hours during a 24 hour period. That in itself is an important economy, but most important is the precise data provided for water shut-off work. The accurate record of major and minor zones of water entry permits you to use, with full efficiency, modern remedial techniques and get back on profitable production faster!

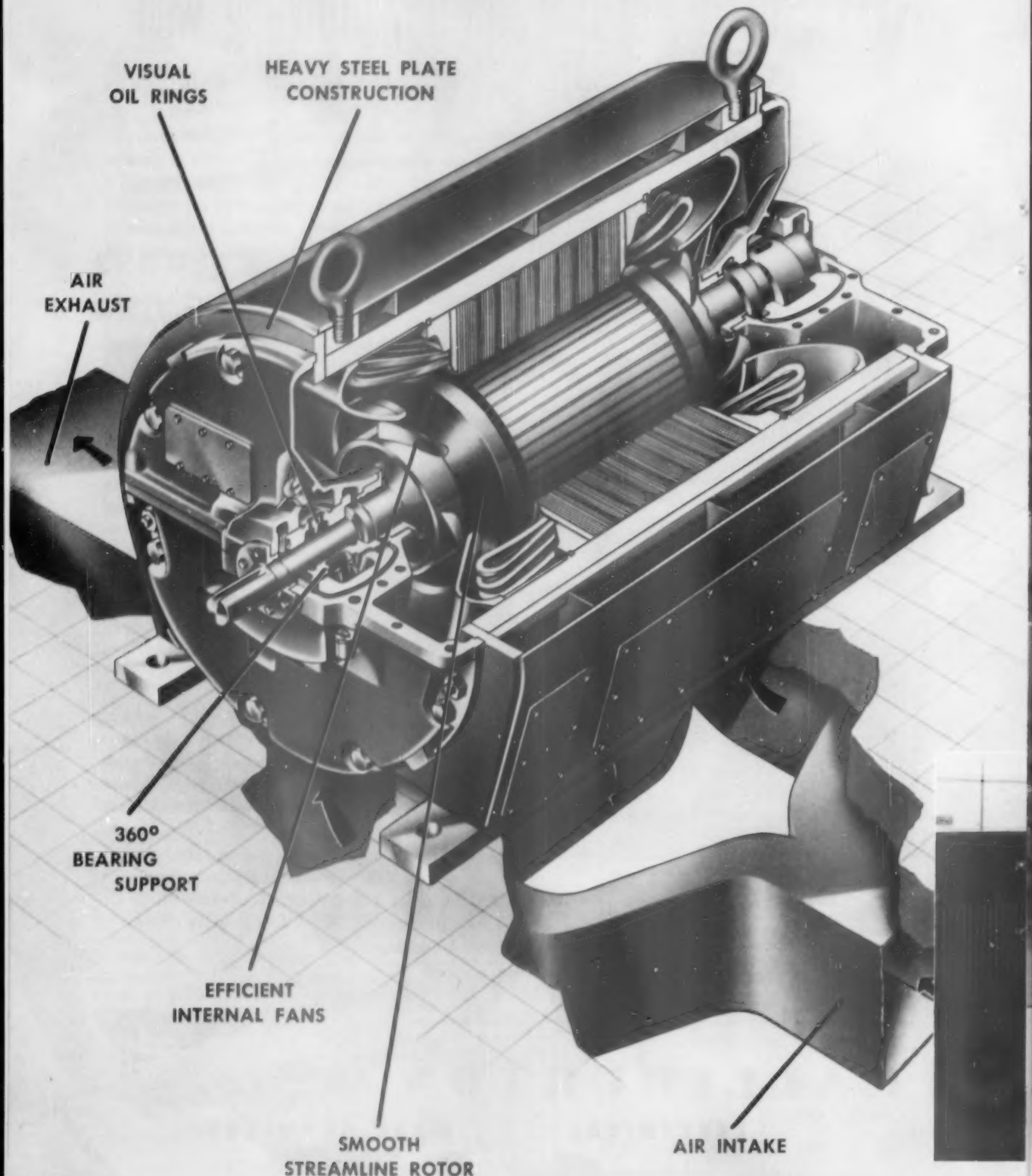
Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

ELECTRICAL WELL SERVICES

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

G-E two pole motor typical of construction below 1000 h.p.



G-E enclosed base-ventilated motors eliminate ugly piping; need no firewall

Here's a motor that improves the appearance of your pipe-line pumping station. General Electric's enclosed base-ventilated motor has air intake and discharge ducts located below floor level eliminating unsightly piping.

General Electric enclosed base-ventilated motors are built without limitation in size and give you the advantages of low cost and all-around protection. Here are some of the features that make this motor particularly suitable for pipe-line pumping applications.

SIMPLE, ECONOMICAL INSTALLATION—possible because no intervening firewall is needed. This means reduced station construction costs. Also, a more direct connection between motor and pump results in freer movement around motors.

SEPARATE MOTOR-DRIVEN BLOWERS—started up in advance—purge the motor and duct system of any gases that may have accumulated during a shutdown period. It also removes excess motor heat from the station without the use of additional equipment.

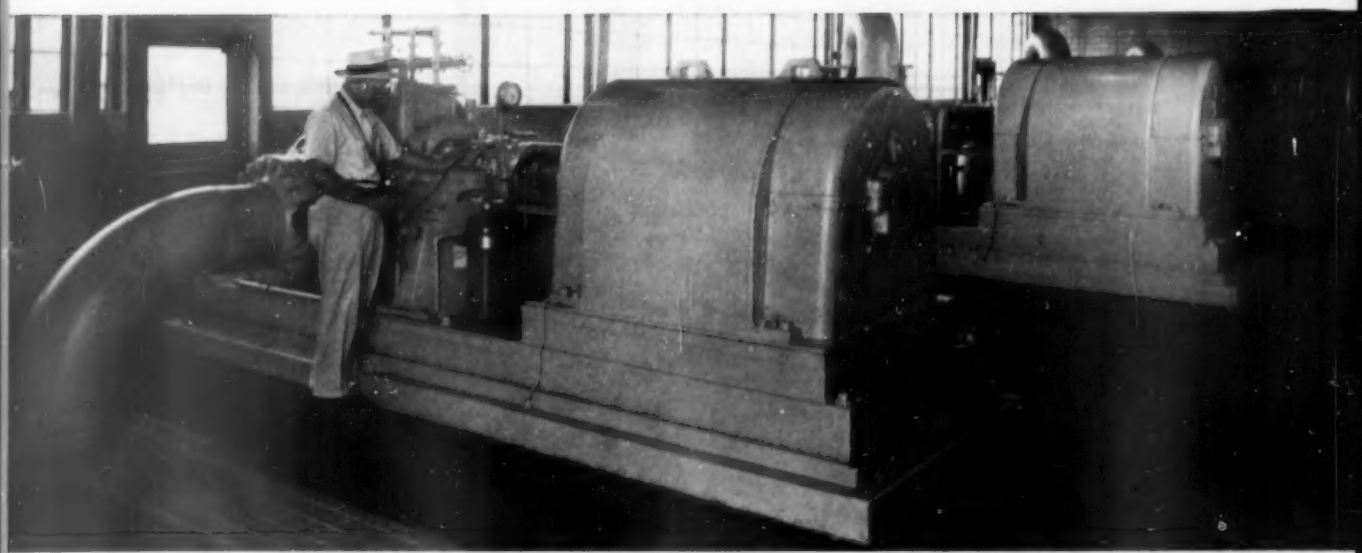
BASE VENTILATION—with intake and discharge ducts opening directly down through the foundation to the source of ventilating air—minimizes the possibility of hazardous leaks from exposed pipe joints.

A WIDE SELECTION from General Electric's complete line of pipe-line motors assures you of getting the right motor for every application. For more information on G-E enclosed base-ventilated motors or any of the complete line, contact your nearest Apparatus Sales Office. *General Electric Co., Schenectady 5, N.Y.*

830-12

Progress Is Our Most Important Product

GENERAL ELECTRIC



AT THE MODERN ELDORADO STATION in the Rancho Pipe-line System, G-E enclosed base-ventilated motors drive single-stage and two-stage pumps. Air ducts are located below floor level eliminating hazardous leaks from exposed pipe joints.

when Diamond Chromates reduce drill-string corrosion

Take out your pencil and figure how many dollars you'd save if the life of your drill strings were increased, say, four times. Quite a saving, isn't it? And it can be done when DIAMOND chromates and bichromates are used to reduce corrosion. In fact, in some cases, drill-string life has been extended as much as *seven times*.

Can you afford not to investigate such a source of savings? Especially when your DIAMOND representative will be glad to back up the facts with technical service.

And while you're talking to the DIAMOND man, ask him how other DIAMOND chemicals are saving money for oilmen as control agents for drilling mud, inhibiting refinery corrosion, and protecting drill strings in heaving shale areas.

Call or write the Sales Office nearest you, or DIAMOND ALKALI CO., 300 Union Commerce Bldg., Cleveland 14, O.

DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO

DIAMOND SALES OFFICES:

New York,
Philadelphia,
Pittsburgh,
Cleveland,
Chicago,
Cincinnati,
St. Louis,
Memphis,
Houston.

Diamond Chemicals for the Oil Industry

DIAMOND ALKALI CHEMICALS ®

Helping dealers to find the right man

Have you heard about the new program to attract and keep better-quality men in service-station jobs?

It's a new Ethyl service.

Called Ethyl's Recruiting and Training program, it will, we believe, be a valuable supplement to the work of individual oil companies, and the committees of the API and other associations which are concerned with this problem. Here, in brief, is the story.

First, to get the complete national picture, we asked more than 4,500 dealers employing more than 15,000 attendants to tell us about their personnel problems. Nearly all reported they had difficulties in recruiting, hiring and training their people. So much so, that nearly half of those hired left because they were "unsatisfactory," and nearly

(Continued on next page)

Printed in U. S. A.

Helping dealers to find the right man

(*Continued from preceding page*)

60% of the men working as attendants had experience of only one year or less.

So we sat down with vocational-guidance people and men from the petroleum industry and worked out our new R. T. (Recruiting and Training) program.

We reasoned, after a good deal of study, that if more people knew of the fine opportunities available in service-station employment, better men would be interested. So a film, booklets, and special kits were created to take this message to young men and their families.

And to help bring these better recruits along, Ethyl's dealer-training materials and services are being enlarged and streamlined.

We hope this new Ethyl service can help your dealers build a better and more stable service-station sales force. Our prime objective is to help the industry in one of its more vulnerable areas: the front door of its business.

ETHYL CORPORATION
NEW YORK 17, NEW YORK

WORTH NOTING

One of the first demonstrations of the superiority of "Ethyl" gasoline occurred at the 1924 Indianapolis Memorial Day Race. Out of a field of twenty-one, the seven cars fueled with gasoline containing "Ethyl" antiknock compound won the first seven places.

The portable lead-in-air analyzer, now considered one of the petroleum industry's most important safety tools, was developed and first produced by Ethyl Corporation.

One teaspoon of "Ethyl" antiknock compound can raise a gallon of gasoline as much as 10 research octane numbers.

Ethyl Service is backed by 31 years of antiknock experience

THE GREATEST SHOWING OF INDUSTRIAL RUBBER PRODUCTS ON EARTH
REPUBLIC RUBBER
WIRETEX
H.P. STEAM
YOUNGSTOWN, OHIO
1. Special heat-resistant cover compound, firmly bonded to carcass.
2. Non-charring asbestos cords interbraided with wires which dissipate static electricity.
3. High adhesion between plies provided by special insulative compound.
4. Steel wires of high-tensile strength braided to resist high steam pressures and make hose Burst-Proof.
5. Heat- and oil-resisting inner tube retains resiliency under high-pressure steam.

SAFETY IS YOUR CONCERN!

Your employees rightfully expect you to furnish them with the Safest tools available . . . including Steam Hose that Will Not Burst!

WIRETEX Steam Hose **will not burst . . . can not** suddenly spray out super-heated steam, blinding steam, maiming steam; yes, even killing steam.

For what you are now paying for ordinary steam hose, you can insist upon getting WIRETEX Steam Hose . . . with a Safety Factor far beyond that provided by ordinary steam hose specifications.

Ask your local Republic Rubber Distributor. If his name is not listed in the yellow pages of your telephone directory, write directly to us.

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INDUSTRIAL RUBBER PRODUCTS

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ENTIRELY NEW!

APPLETON

Explosion-Proof! Dust-Tight! Rain-Tight!

CIRCUIT BREAKER, MOTOR STARTER and COMBINATION MOTOR STARTER

UNILETS

REG. U.S. PAT. OFF.

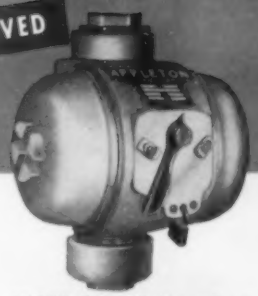
Illustration shows the high safety factor, versatility, and space-saving attributes of *Appleton* explosion-proof circuit breaker and motor starter *Unilet* Combinations. Your own installation needs, no matter what they may be, can also be met with these remarkable new Unilets.

BREAKER LOCKED IN "OFF" POSITION

MOTOR STARTER NO. 5 . . . EXPOSED FOR **SAFE** MAINTENANCE . . . but no "down time" on other operating equipment

SAFE ENTRANCE TO MOTOR STARTER WITHOUT DISCONNECTING OTHER BRANCH CIRCUITS . . . ONLY *APPLETON UNILETS* HAVE THIS FEATURE!

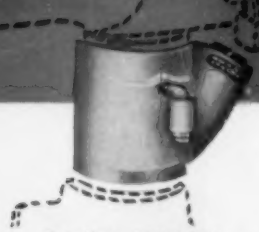
U. L. APPROVED



"CB" Circuit Breaker UNILETS

Assure easy, safe, flexible, and economical installation for protection of service entrance, feeder or lighting, appliance, and branch circuit conductors up to 225 amperes. U. L. Approved individually and in banked groups up to three for forms 1 and 2 without using dividing seal.

U. L. APPROVED



Sealing UNILETS

Available for use as explosion-proof seal where needed on circuit breaker and motor starter Unilets. This Sealing Unilet is furnished on all Combination Motor Starters, and when properly sealed permits safe entrance to a motor starter in single or banked combination installations, without disconnecting other branch circuits.

U. L. APPROVED

"LS" Motor Starter UNILETS

For 3-phase induction motor control up to 100 H.P. at 600 volts maximum. Lightweight construction of larger sizes eliminates need for heavy lift equipment . . . assures easy, time-saving, inexpensive installation. Also made for reversing and two-speed motors.

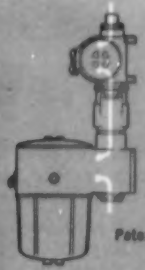
The greatest advance in explosion-proof design in years!

● You expect more from *Appleton,* and you get it! The proof lies in these completely new and different *Appleton* circuit breaker and motor starter *Unilets.* Alone or in combination, their design, construction, and performance give you maximum safety, unparalleled ease of wiring, installation and maintenance, and initial and long-term money savings not available with any other equipment! You'll find their exclusive features invaluable on any hazardous-location motor control or power lead-in installation, large or small, indoors or outdoors, where tricky wiring, corrosive and flammable atmospheres, dust, or weather difficulties appear insurmountable. Where absolute safety is required day in and day out and every minute of the day, you can place complete confidence in *Appleton Unilets.*

IMPORTANT ADVANTAGES

- **FIRST to be U. L. Approved for BANKED Circuit Breaker Grouping**
- **Combinations Meet U. L. Requirements through Approval of Components**
- **FIRST to Achieve Safe Entrance to Motor Starter of a Combination without Shutting Off Other Branch Circuits**
- **Full 7-Thread Explosion-Proof Protection . . . No Bolts to Strip or Flanges to Nick**
- **Unmatched Accessability for Easiest Wiring and Servicing on Every Job**
- **Light-Weight Construction for Easy Installation without Heavy Lift Equipment**
- **Quick Interchange on All Leading Makes of Circuit Breakers and Motor Starters**
- **Flexible Field Set-ups Assured with Single and Duplex Male and Female Hub Adapters**

BANKED CIRCUIT BREAKER GROUPING
Male to female hubs permit easy grouping. Cuts costs, streamlines panel set-ups, assures coordinated control without sacrificing safety. U. L. Approved up to groups of three in smaller size Unilets.



VERTICAL "STRAIGHT-THRU" DESIGN
Simplifies wire pulling, saves time. Ample working space eliminates need to remove breaker mechanism from enclosure, yet assures clean, safe wiring.

Patent Applied For

OVER-SIZE CONDUIT and CONDUCTORS
May be run with hub adapters for subsequent installation of higher rated breakers without replacing complete Unilet or existing conduit.

PUSH-BUTTON and PILOT DUTY CONTROL
Combines convenience and selectivity including built-in "Start-Stop," "Hand-Off-Auto.", or "Jog-Run-Off" control where needed.

Sold Exclusively Through Selected Wholesalers

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Industrial Lighting

"ST" Liquid-Tight Connectors

Automatic Reelites

Outlet Boxes, Covers, Switch Boxes

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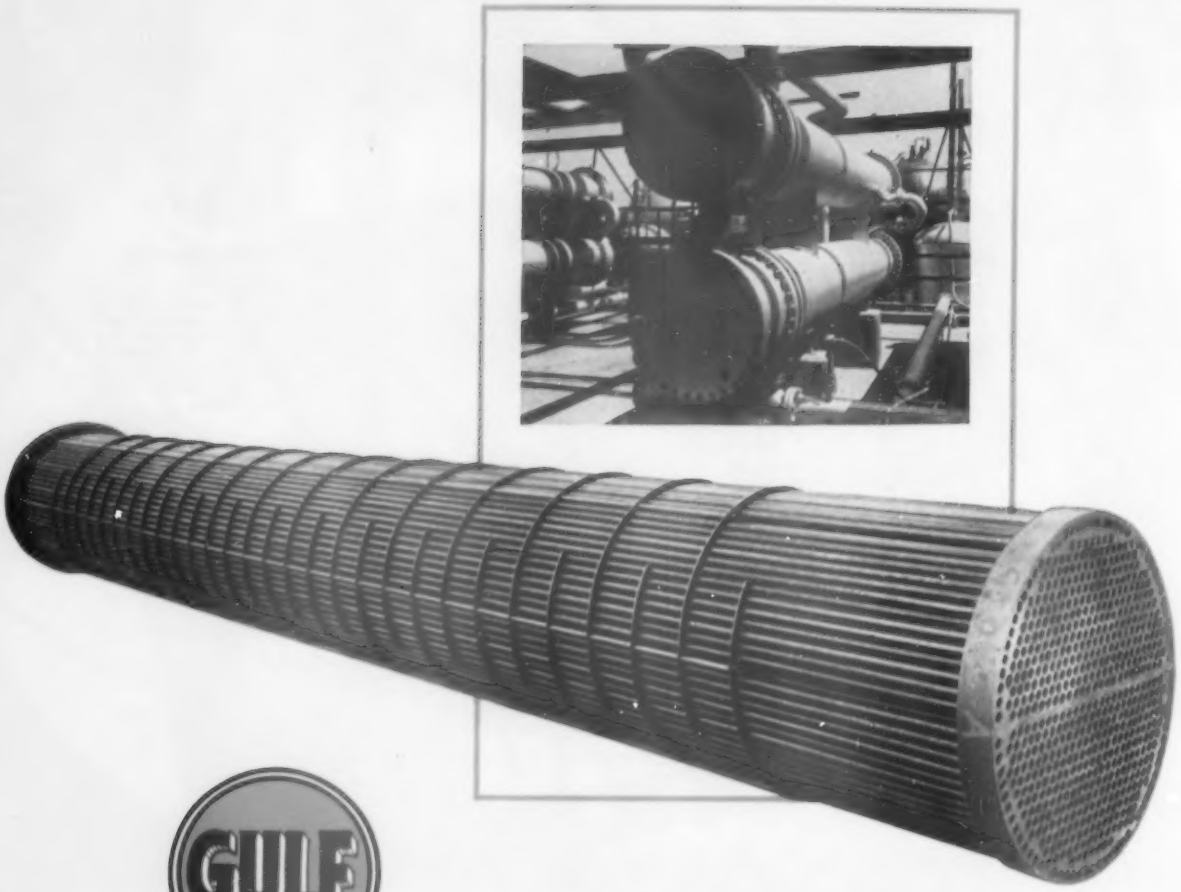
A complete catalog section containing informative technical data.

Rely on APPLETON . . . *The Standard for Better Wiring*



GULF uses ELECTRUNITE

Heat Exchanger Tubes

In fact, ELECTRUNITE Tubes have been in Gulf heat exchangers for the past twenty years, helping to keep refinery processes on-stream.

This kind of dependability begins with the steel used in Republic ELECTRUNITE Tubes. Made in Republic's own mills, its quality is controlled from ore to finished tubing.

Ductility is controlled for uniformity. Corrosion resistance is uniform all around the tube, from end to end. And full normalizing in controlled atmospheres assures clean, scale-free surfaces.

These advantages can add up to this:

1. **Longer time between re-tubings**
2. **More hours of production with less down time**
3. **Lower cost per year**

These facts have been proved not only by Gulf, but by the millions of feet of ELECTRUNITE Heat Exchanger Tubes used in thousands of heat exchangers in scores of industries. You can find more facts in Booklet CEC-54. Write for it.

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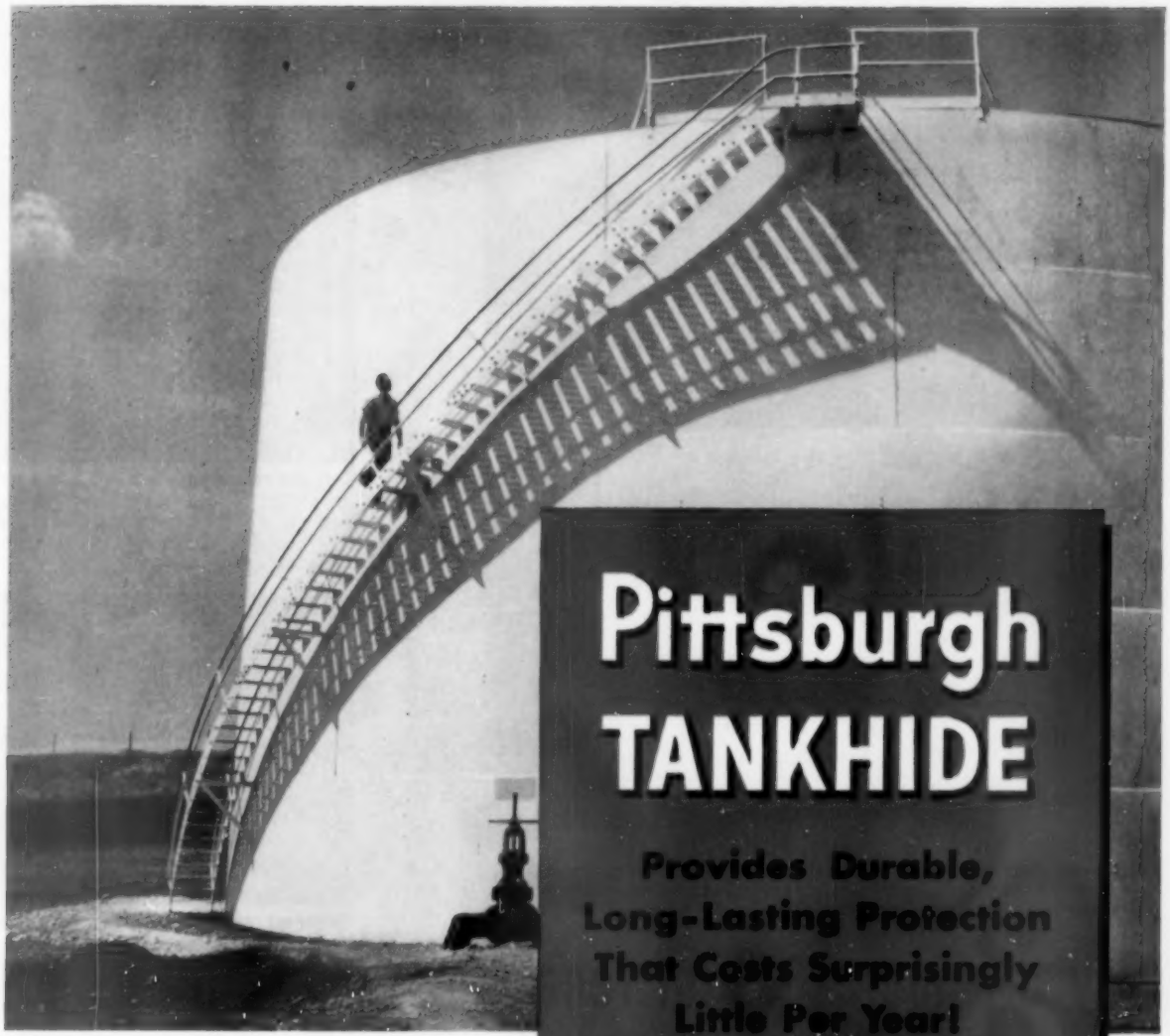
Steel and Tubes Division
219 E. 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic ELECTRUNITE
BOILER, CONDENSER AND HEAT EXCHANGER TUBES



Pittsburgh TANKHIDE

Provides Durable, Long-Lasting Protection That Costs Surprisingly Little Per Year!

FOR DOWNRIGHT TOUGHNESS there's no other protective coating like Pittsburgh's TANKHIDE! It's a rugged, long-lasting finish, highly resistant to corrosion and the weather. It goes on easily, dries quickly and "stays put" for enduring protection.

With its unusually high heat and light reflection characteristics, Pittsburgh's Synthetic White TANKHIDE prevents the excessive heat absorption that brings about waste by evaporation.

The brilliant white appearance of TANKHIDE is maintained throughout its long life by its self-cleaning action. The quick set and firm character of the film during the drying period prevent collection of dirt and insects . . . also keep damage from rain, scuffing and abrasion at a minimum.

Pittsburgh TANKHIDE is also available in synthetic gray and black as well as in gray and black oil-base coatings for various purposes. These can be used on wood and metal surfaces with equally good results.

Pittsburgh also provides a wide variety of quality finishes for every need in the petroleum industry. Call on us for expert advisory service. Our wide experience can often help you and save you time and money.

PITTSBURGH PLATE GLASS CO., Industrial Paint Div., Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N.J.; Springdale, Pa.; Atlanta, Ga.; Houston, Texas; Torrance, Calif.; Portland, Ore. Ditzler Color Div., Detroit, Michigan. Thresher Paint & Varnish Division, Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Div., Pittsburgh, Pa.

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● Pittsburgh has a practical manual of information for those who buy and use paints. Contains complete descriptions of all Pittsburgh finishes for the petroleum industry. It also explains how best to use them. We'll be glad to send you a copy—FREE. Mail this coupon.

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Please mail me copy of your handy reference manual, "Pittsburgh Paints for the Petroleum Industry."

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PITTSBURGH PLATE GLASS COMPANY

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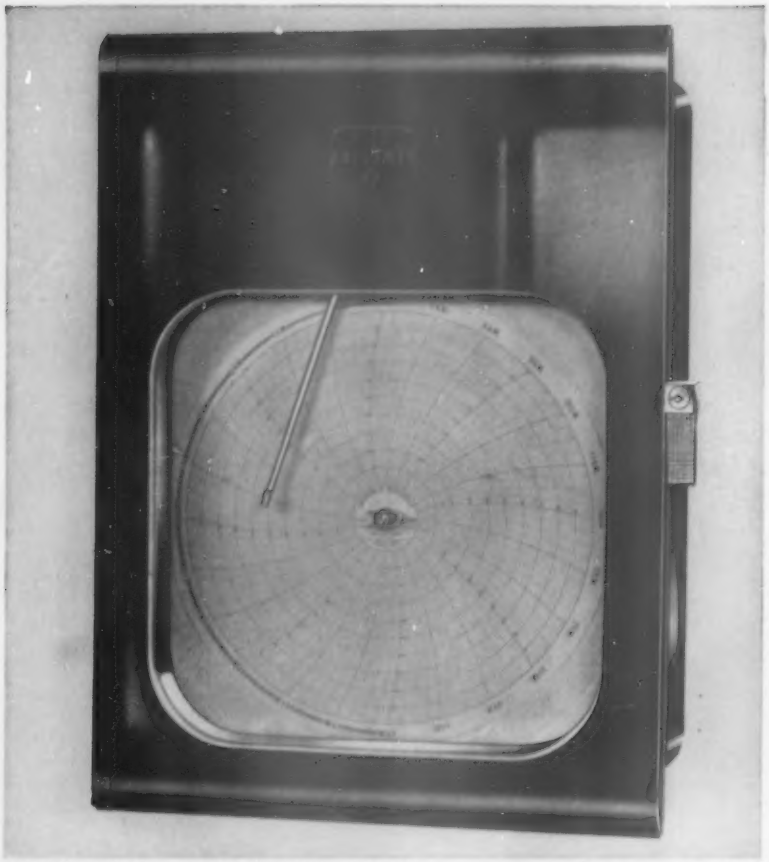


EASY-TO-USE BRISTOL RECORDING GAUGES come in pressure ranges from 0 - 0.2 inch of water to 0 - 10,000 psi. Vacuum gauges are available in various ranges from 0 - 30 inches of mercury and absolute pressure gauges in ranges as low as 0 - 6 mm mercury absolute.

Why are more Bristol recording gauges in use than all others put together?

• That's easy — accuracy and dependability are the reasons.

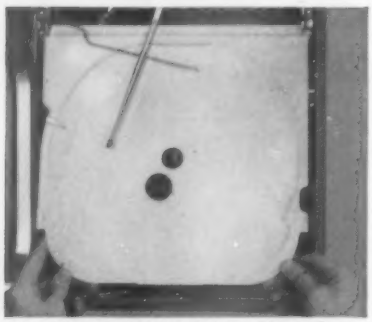
For accuracy, Bristol's measuring elements are unsurpassed. They are the product of 65 years of research and development. Bristol engineers are constantly engaged in developing pressure and vacuum measuring elements of higher accuracy, greater sensitivity, and increased stability.

As for dependability, many Bristol gauges have been in constant operation for more than 40 years — without special attention of any kind!

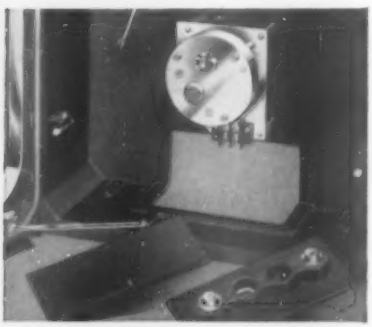
You can get the Series 500 gauge in models designed for recording, controlling and telemetering. Write today for free 32-page Bulletin G621. The Bristol Company, 120 Bristol Road, Waterbury 20, Conn.

Many ranges carried in stock for immediate delivery

LOOK AT THESE "HUMAN-ENGINEERED" FEATURES!



SNAP-ON TYPE CHART PLATE — No tools are needed to remove chart plate. Spring, finger release permits quick access to the space beneath the chart. Plate is easily replaced.



UNIVERSAL CONNECTION BLOCK — Mounting block for instrument connections easily changed from bottom to back of case or vice versa; measuring system can be removed or replaced.

PEN LIFTER — Simple, non-obscuring pen lifter, mounted independently of the chart plate, raises pen from the chart, provides complete freedom for working on instrument with chart plate removed.

BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

JOHNSTON SELECTIVE ZONE TESTER

gives you all four with only one trip in the hole

TESTS MORE THAN ONE ZONE in a single trip . . . and the Selective Zone Tester has been field proven in actual service in many areas.

• **ELIMINATES CEMENT PLUG!** Packers above and below the testing zone seal it off, special control assures accurate results!

TESTS ZONES YOU PASS UP to allow running a DST on other possibly productive levels. Even pinpoints gas/oil and water/oil contacts in just one trip!

TESTS WITHOUT TAIL PIPE, and at any level! You save rig time, save money, get a more accurate test than ever before.

AVAILABLE everywhere
ACCURATE every time

JOHNSTON TESTERS, INC.
HOUSTON, TEXAS

Gentlemen:
At no obligation, please rush complete information on the Johnston Selective Zone Tester.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

JOHNSTON TESTERS

first in drill stem testing

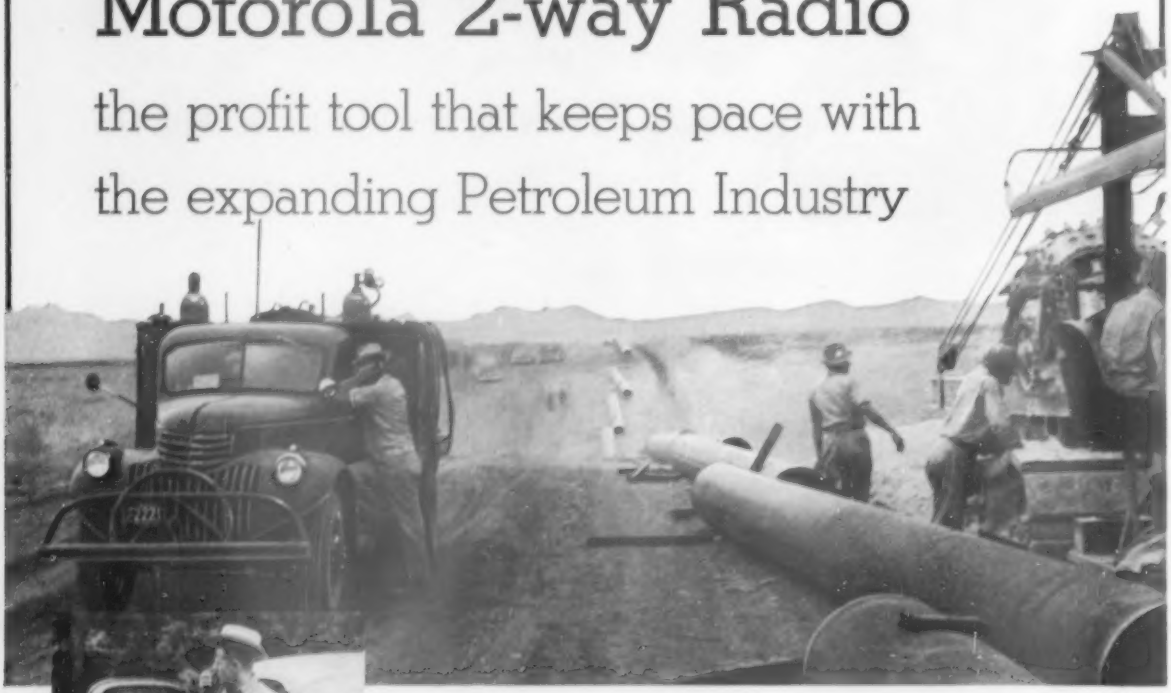
HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.

FORMATION AND CASING TESTING — JOHNSTON

Motorola 2-way Radio

the profit tool that keeps pace with the expanding Petroleum Industry



On a remote strip of pipeline, a road superintendent exchanges some critical information with his spread foreman some 22 miles away saving several hours delay of another complete work unit.

Alert dispatcher "quarterbacks" important movements far and wide while his hourly record shows proof of tremendous accumulated savings in time, equipment, fuel and customer good will.

Oil and gas production and distribution is being maintained today by hundreds of companies with the direct help of Motorola radio communications.

Easily integrated into your existing operation—for improvements in customer relations, maintenance schedules, employee relations, cost control, and a multitude of minor problem areas.

Remember! To attain maximum performance at maintained minimum cost per unit per month—most companies insist on Motorola equipment to do the job. They have learned from first hand experience to count on superior and reliable performance . . . and they have found:

It Pays to operate Your Own
2-Way Radio Communications,
the tool pioneered to practical success
by the world's largest exclusive radio
and electronics manufacturer

Motorola . . . the complete supplier of radio communications and industrial control, microwave relay, power line carrier, supervisory control, frequency shift V.F. carrier, mobile communications, and telemetering equipment.

national **Motorola** RADIO COMMUNICATIONS service **2-way Radio**

Motorola Communications & Electronics, Inc.
A SUBSIDIARY OF MOTOROLA, INC.

4501 W. Augusta, Chicago 51, Ill. • **Rogers Majestic Electronics, Ltd., Toronto, Canada**

EASTCO

DOUBLE CHECKS your survey...

"Here is reproduction of drift indicator disc, actual size, showing both recordings 4½° off vertical."

... WITH EASTCO SELF-CHECKING MECHANICAL DRIFT INDICATOR

There are other drift indicators, but Eastman, and only Eastman makes one to DOUBLE CHECK itself (2 readings) with a 40-second interval between.

No batteries, light bulbs or photo sensitive discs are used. The Eastco Self-Checking Drift Indicator is COMPLETELY MECHANICAL.

This instrument is the smallest drift indicator on the market. It can be go-deviled or lowered into the hole on any conventional line.

Operators may contract for this instrument on a daily or term rental basis at a nominal charge. Call the nearest Eastman office for details and a demonstration.

...another instrument perfected from Eastman's years of field experience, engineering, research and design development work.

Call an Eastman Engineer today; He's ready to serve you Anywhere, Anytime!

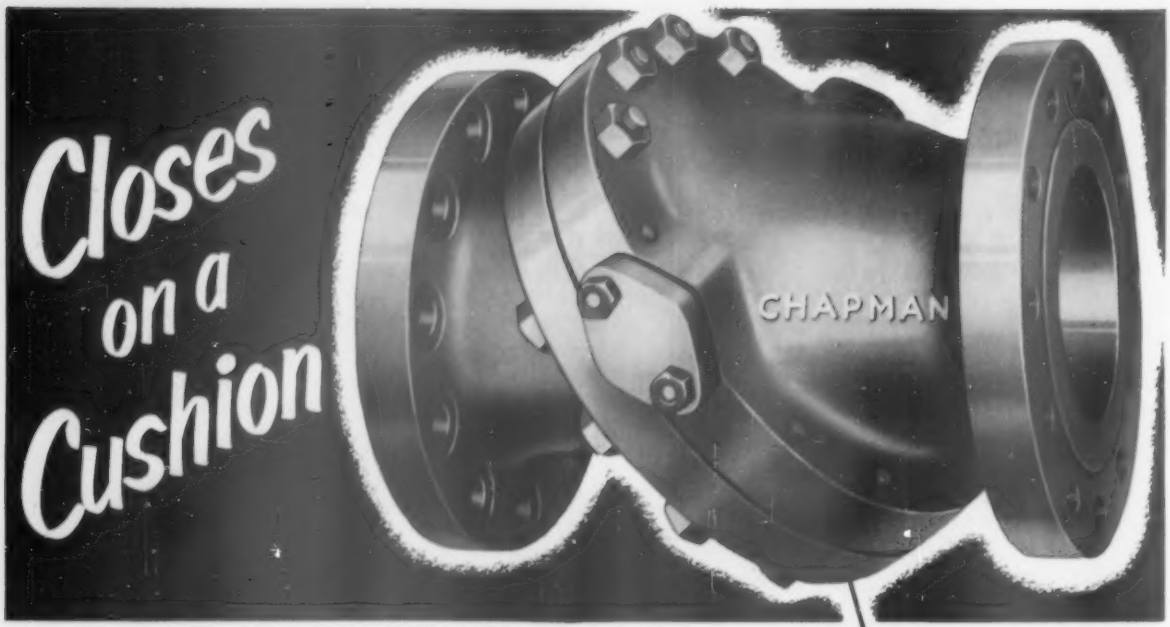
Eastman Oil Well Survey Company

LONG BEACH DENVER HOUSTON

Export Sales and Service:
EASTMAN INTERNATIONAL COMPANY
Denver, Colorado

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

Chapman's Tilting Disc Check Valve

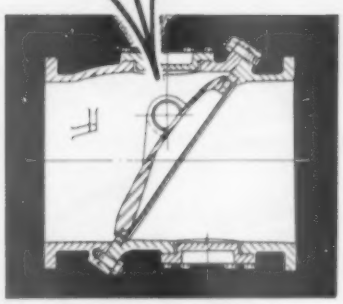


...for low cost, slam-free operation

Balanced pressures *cushion* the movement of the disc in Chapman's Tilting Disc Check Valve. The valve closes quickly but quietly, in all but unusual piping arrangements. There's no slamming to damage pipe-line joints or the valve itself. And *drop-tight* closure eliminates sliding wear on the disc and seat.

In the open position, the "airfoil" designed disc rides firmly against stops, without swinging or fluttering. That's why the hardened extra-large hinge pins give extremely long wear. And the absence of turbulence is one reason why head loss through Chapman's Tilting Disc Check Valve is lower than through any other type of check valve.

Low head loss, increased wear resistance and freedom from destructive slamming make Chapman's Tilting Disc Check Valves unbeatable for almost every installation. Write for Catalog No. 30 today.



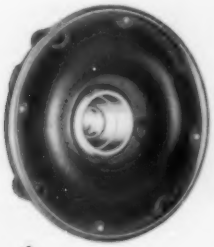
Here's why
CHAPMAN Tilting Disc Check Valves
***Keep Quiet* All Their Lives**

This specially designed "airfoil" disc balances perfectly in open position . . . then drops easily to closed position (cushioned by the flow). No jarring or slamming, in usual pipe-layouts. Write for bulletin.

THE CHAPMAN VALVE MANUFACTURING COMPANY
INDIAN ORCHARD, MASSACHUSETTS

THERE'S MORE THAN BEAUTY IN CENTURY'S NEW LOOK!

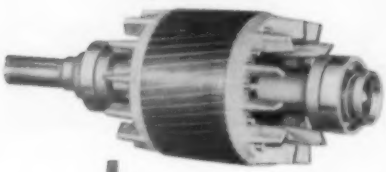
Cabot Unit, equipped with CENTURY Splash-proof motor. CENTURY'S "Weathergard" has important new features . . . will be even more popular.



Deflector in end bracket assembly controls flow of air from fans.

CENTURY has wrapped up the new NEMA standards in a line of greatly improved electric motors you'll thoroughly enjoy using. These motors break even CENTURY records for sleek design and top performance.

CENTURY'S "Weathergard" Motors solve obvious problems when used where there is no protection from weather, or indoors in the presence of dripping, splashing fluids.

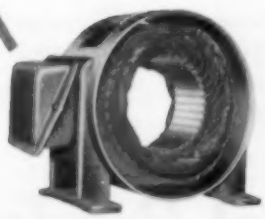


High pressure die-cast aluminum rotor with powerful fans for 2-way ventilation.

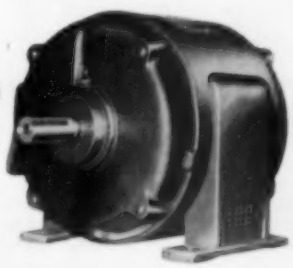
It is natural to like anyone who takes an interest in you, and the new CENTURY line certainly indicates more than ordinary interest in seeing that you get a better deal in electric motors of every type and size.

Any electric motor is likely to be good, but in your business and ours CENTURY has an edge; it is made for the oil industry.

Ask us for information about the new NEMA standards and what CENTURY has done to put them to work for you.



Ventilating passages enable the fans to keep CENTURY windings uniformly cool.



CENTURY "Weathergard" frames are completely screened.

J&L STEEL

Jones & Laughlin STEEL CORPORATION

SUPPLY DIVISION – TULSA, OKLAHOMA

Serving The United States and Canada

PESA PARTNERS IN PETROLEUM PROGRESS

CARBON, ALLOY, STAINLESS-CLAD AND OTHER FERROUS AND NON-FERROUS METALS

name your dish

You name it and we'll supply it. Claymont Flanged and Dished Heads are available in carbon, alloy and stainless-clad steel in diameter sizes from 9 inches to 19 feet—in thickness from 3/16 inch to 6 inches. Our flanging department can also handle forming operations on both ferrous and non-ferrous metal supplied by you.

To order, contact our nearest sales office or write direct to Claymont Steel Products Department, Wickwire Spencer Steel Division, 813 West Street, Wilmington 99, Delaware.

For your convenience, Claymont Flanged and Dished Heads are strategically stocked at CF&I warehouses throughout the country.

CF&I

Claymont Steel Products

PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION • THE COLORADO FUEL AND IRON CORPORATION

ABILENE • ALBUQUERQUE • AMARILLO • ATLANTA • BOISE • BOSTON • BUFFALO • BUTTE • CASPER • CHICAGO • DENVER • DETROIT • EL PASO • FT. WORTH • HOUSTON
LINCOLN (NEB.) • LOS ANGELES • NEW ORLEANS • NEW YORK • OAKLAND • ODESSA • OKLAHOMA CITY • PHILADELPHIA • PHOENIX • PORTLAND • PUEBLO
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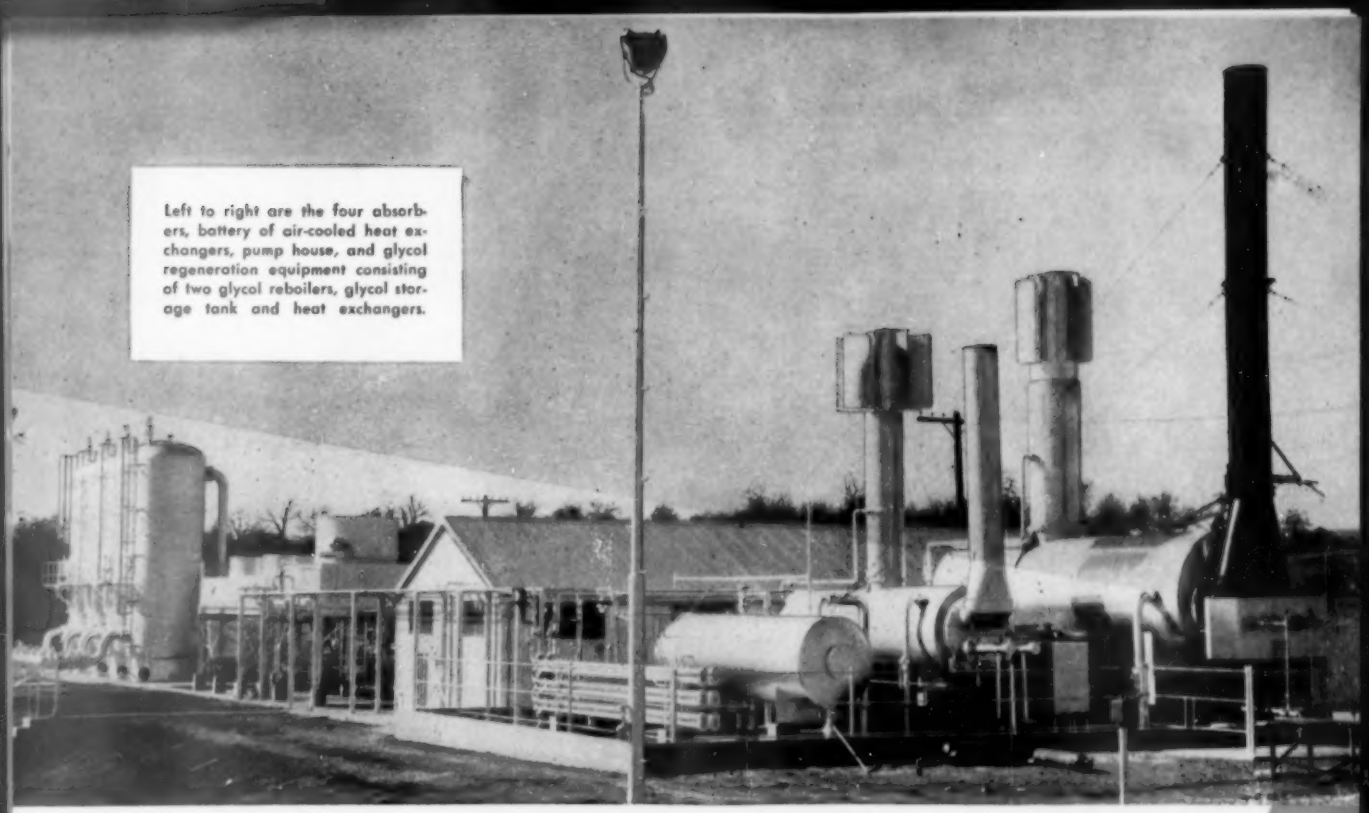
OTHER CLAYMONT PRODUCTS

Carbon and Alloy Steel Plates • Stainless-Clad Plates • Manhole Fittings and Covers
Large Diameter Welded Steel Pipe • Flame Cut Steel Plate Shapes

2490



Left to right are the four absorbers, battery of air-cooled heat exchangers, pump house, and glycol regeneration equipment consisting of two glycol reboilers, glycol storage tank and heat exchangers.

560,000,000

SCF OF RESERVOIR GAS PER DAY...

...Can Be Dried In This BS&B Built Dehydration Plant At Depew, Oklahoma!

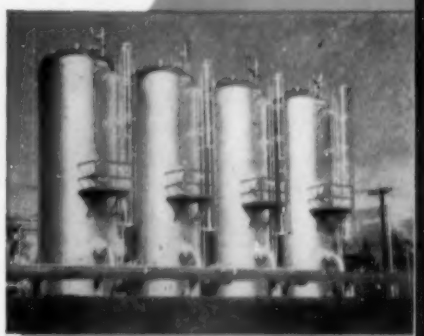
When Oklahoma Natural Gas Co. wanted to double the capacity of their Dehydration Plant serving their 57 billion cubic foot underground gas reservoir near Depew, Oklahoma, they called in BS&B — designers and builders of the original plant.

The job was accomplished within a few months by the addition of two new absorbers, and by doubling the capacity of the cooling system and the glycol reactivation equipment. At the same time, provision was made for additional plant expansion when the need arises.

Present capacity of the plant is 560,000,000 SCF/D at 800 psi pressure. During one month when 4,600,000,000 cubic feet of gas was withdrawn from the reservoir and processed through the new plant, the amount of moisture removed from the gas was equivalent to 20,000 gallons of water!

If you have a dehydration problem —at the well head, at a field processing installation or along the pipeline—why not take advantage of BS&B's many years of successful experience in solving it? Your BS&B Representative will be glad to discuss it with you . . . or you may write

OIL & GAS EQUIPMENT DIVISION, DEPT. 1-A10A

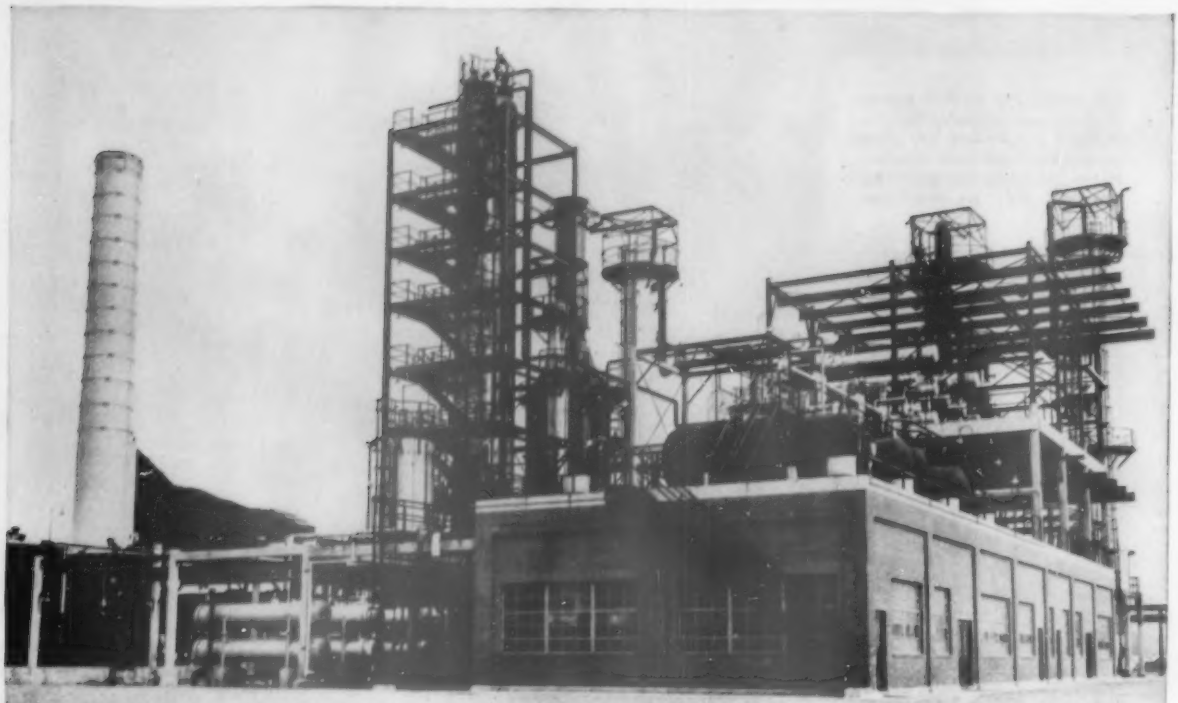


Close-up of the four absorbers where the moisture-laden gas gives up its water vapor to a circulating solution of lean triethylene glycol. They are 21 feet high and 8 feet in diameter.

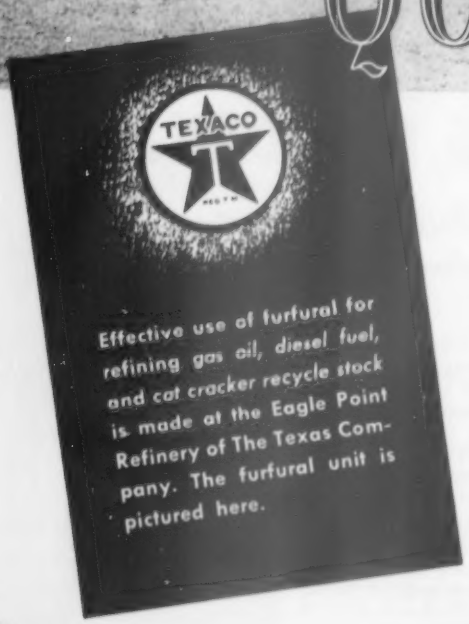
EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.

1708 West Main Street Oklahoma City, Oklahoma



selectively yours QO® Furfural


TEXACO
Effective use of furfural for refining gas oil, diesel fuel, and cat cracker recycle stock is made at the Eagle Point Refinery of The Texas Company. The furfural unit is pictured here.

Through the years QO furfural has gained widespread recognition as a selective solvent in the processing of lube oil, and now there is a growing awareness of its desirable characteristics as a solvent in performing other separations in the refinery. Better furnace oils, improved diesel fuel, and a new approach to increasing gasoline output of catalytic crackers at minimum expense are the direct results.

The same combination of basic properties and attractive economics which have made QO furfural so successful in refining lube oil applies with equal force to these newer applications. These basic values include: sharp selectivity, ease of recovery, low cost, ready availability, and freedom from excessive toxicity.

The furfural processes are available for licensing and we are glad to refer you to the licensor, as well as to supply additional information about QO furfural itself. Write for bulletin 203.

The Quaker Oats Company CHEMICALS DEPT.

339R The Merchandise Mart, Chicago 54, Illinois
Room 539R, 120 Wall St., New York 5, N. Y.
Room 439R, P. O. Box 4376, Portland 8, Oregon
In the United Kingdom: Imperial Chemical Industries Ltd., Billingham, England
In Europe: Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S. A., 3, Rue Pillet-Will, Paris IX, France
In Australia: Swift & Company, Pty., Ltd., Sydney • In Japan: F. Kanematsu & Company Ltd., Tokyo

PHOTO COURTESY LAMSON MOBILIFT CORPORATION, PORTLAND, OREGON

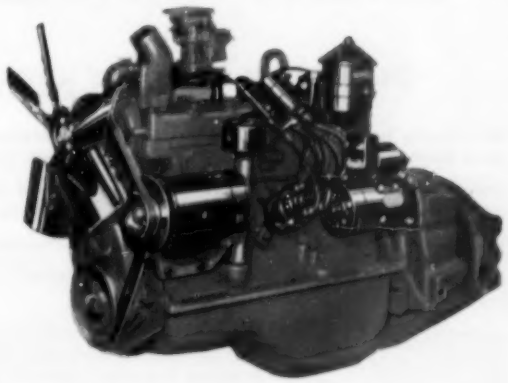
CHRYSLER *power partners save work, equipment, triple clutch life*

Here's a lift truck that slips into tight places like a shoehorn and can lift up and carry nearly 5,000 pounds. This Model D-424 Mobilift nicely combines Chrysler Power and Chrysler Gyrol Fluid Coupling with two-speed constant-mesh transmission and hand operated push-pull levers that clutch and de-clutch transmission gears. The end result is a smooth-performing lift truck offering excellent operator control through its entire speed range.

Mobilift is powered with the popular 230 cubic inches displacement Chrysler Ind. 30 Engine—an ideal power plant for this type of equipment from both the standpoint of performance and operating economy. Gyrol Fluid Coupling, designed as a power partner for Chrysler Industrial Engines, cushions sudden starts and stops, triples clutch life and permits the oil-smooth clutch engagement necessary with a constant-mesh transmission.

Whether lift trucks, farm combines, power units for irrigation or oil wells, Chrysler has industrial engines for your selection . . . factory-equipped for your needs.

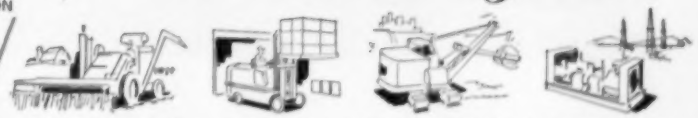
And remember, when you install or specify Chrysler Industrial Engines, you *do not* pay a premium, because Chrysler Power is not expensive. Production-line methods adapted to specialized industrial engine building provide custom-built engines at mass-production prices. See a Chrysler Industrial Engine Dealer, or write: ***Dept. 1410, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***



CHRYSLER *Industrial Engines*

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

HORSEPOWER WITH A PEDIGREE



AGRICULTURE • INDUSTRY • CONSTRUCTION • OIL FIELDS

NEW Koehring 205 Truck Crane gives you lowest price per pound of lifting capacity. Its maximum 15-ton lift (on 25-ft. boom) offers a big *plus* in work capacity over other machines in the "½-yard" class. Remember, lift capacity is WORK CAPACITY. The 205's extra lift capacity increases its work capacity with all attachments. As a clamshell or dragline, it handles ½ to ¾-yard buckets on a wide work range. As a heavy-duty ½-yard shovel or hoe, its extra strength and powerful cable crowd increase production and speed of operation.

As a crawler crane, 205 has 10-ton capacity; 30 to 50-foot boom lengths. Converts to all standard excavator and crane attachments.

CHECK THESE OTHER 205 ADVANTAGES:

- **32½ m.p.h. travel speeds on rubber-tired truck mounting.**
- **Only 2 major shafts in upper machinery — simple, accessible.**
- **Big 20-inch clutches, self-adjusting.**
- **4 hook-rollers, eccentric adjustment.**
- **Antifriction power flow for dig, lift, swing, and travel.**
- **On standard or extra-long crawlers, 16, 20, or 24-inch shoes.**
- **Automatic crawler traction-brakes.**
- **Independent traction optional.**

K484 OGJ

Get the complete story in new 205 bulletin. Ask your Koehring distributor for your copy . . . or write us!

KOEHRING COMPANY, Milwaukee 16, Wis.

NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... STATE .....

KOEHRING

Subsidiaries: PARSONS · JOHNSON · KWIK-MIX

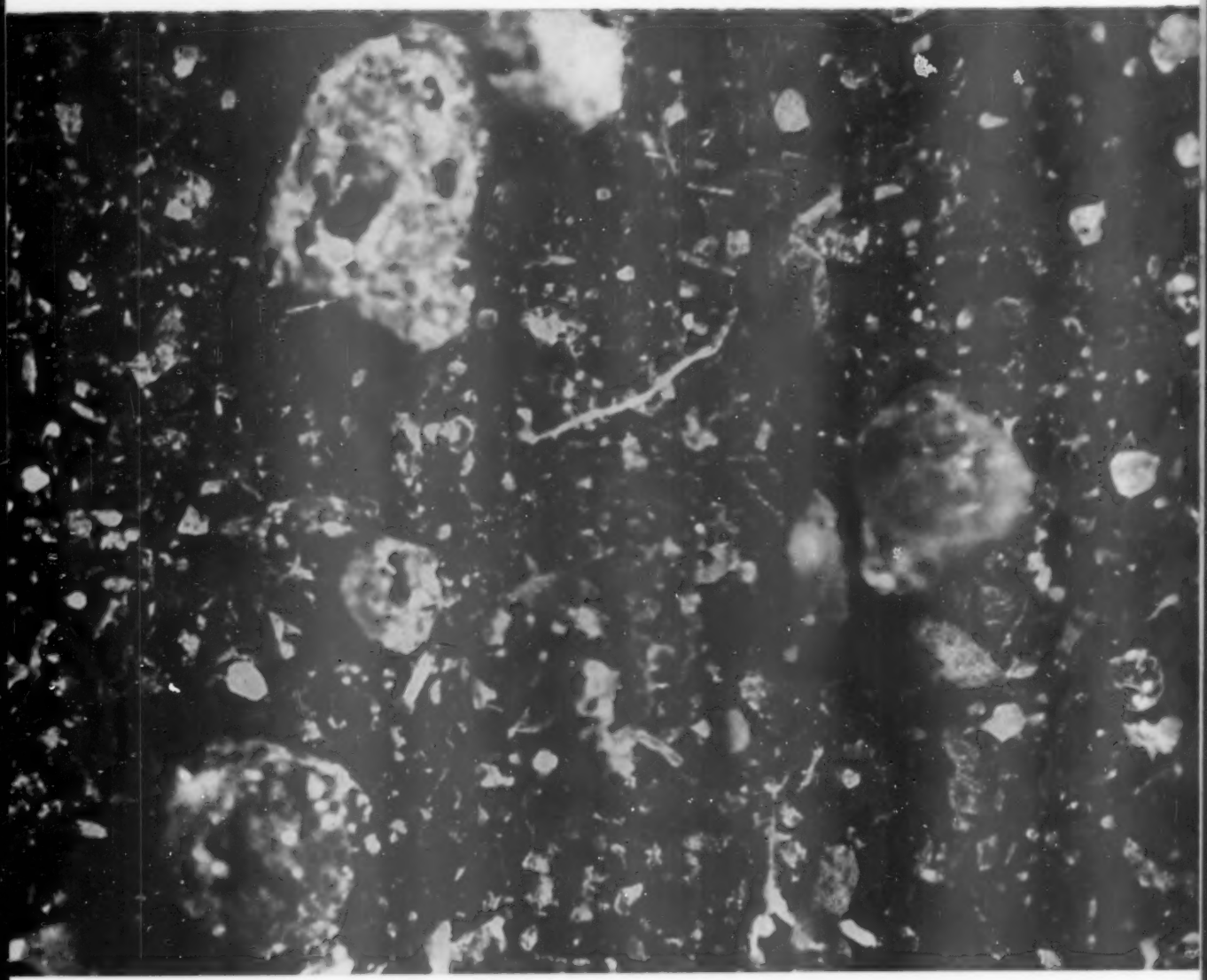
An ear to the ground for oil . . .

The geologists have given the go-ahead. The surveyors have plotted the line. Now come the listeners — with their intricate seismological instruments. If this man's chart looks good, they'll drill. And he'll go on to listen someplace else. His search may be blind and silent. But he does just as much to keep America rolling as the drillers who finally bring in the well.

The Texas Company

TEXACO

How clean . . . . .



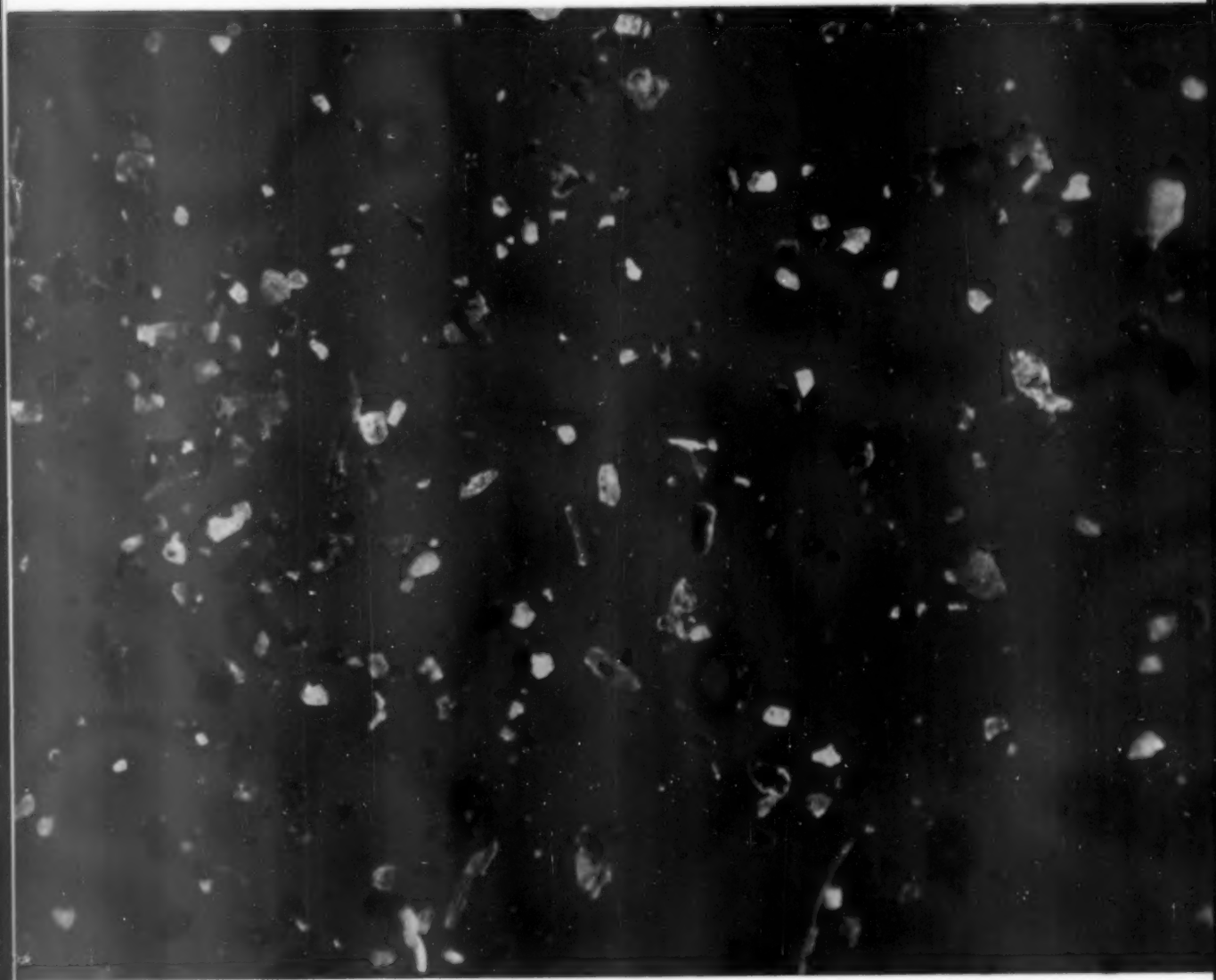
Oil that meets pipeline specifications usually is called "clean" or "pipeline" crude, the terms "clean" or "pipeline" referring to the fact that the BSandW content of the crude is sufficiently low to be acceptable for shipment through the pipelines.

The photomicrograph above, magnified 70X, is of the sediment extracted from one gallon of so-called "clean" crude. When the photomicrograph was made, the crude contained 96.7 parts per million of solids—minute particles of quartz, iron oxide concretion, carbonate scale, rust, etc. Such "clean" oil will cause excessive wear in sub-surface hydraulic oil well pumps, as well as in meters, valves and surface pumping equipment.

The photomicrograph on the right hand page, also magnified 70X, graphically shows how the sediment content of the same "clean" oil has been reduced by the intensive treatment of the Petreco Electric Sediment Separator. Note how the amount and density of the sediment has been reduced and that all the large particles have been eliminated. In this Petreco treated sample, the sediment content has been decreased to 20.9 parts per million.

In one typical case history, a comparable reduction of sediment content decreased sub-surface hydraulic pump wear (as determined by pump efficiencies) from 12% per month to 1% per month; increasing pump life (as affected by sediment abrasion) from 5 months to an estimated 3 years.

. . is "clean" crude?



Photomicrographs by J. G. Suthard

A super-purified crude oil will enable you to gain operating advantages: be sure you get the facts on Petreco Electric Sediment separation. Just write or call

PETRECO®

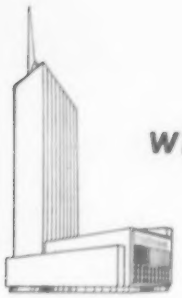
A DIVISION OF PETROLITE CORPORATION

3202 South Wayside Drive, Houston 1, Texas · · · 1390 East Burnett Street, Long Beach 6, California

ELECTRIC PETROLEUM PROCESSING

DESALTING • DEHYDRATING • DISTILLATE TREATING
SEDIMENT SEPARATING • DESAPONIFYING

SS 54-6



What does it take to build an "Oil Bank"?

LOANS

It takes money . . . big money to find and produce oil. Oil men know that the Republic is about the best place in Texas to get it.

LEASES

Leases are the beginning of the business end of 4,171,700 barrels a day of southwestern oil production. Financing the rest of the business of oil is what makes an "Oil Bank".

This is your Republic!

REPUBLIC NATIONAL BANK of Dallas

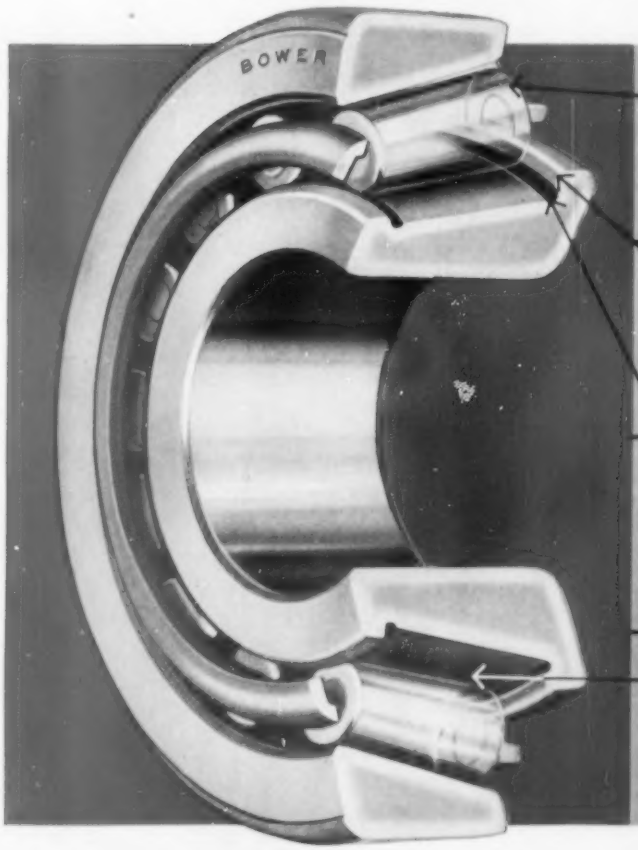
CAPITAL AND SURPLUS $50,000,000 LARGEST IN THE SOUTH

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Here's how BOWER Spher-o-honed design lengthens bearing life... cuts maintenance costs!

The Bower tapered roller bearing design features shown on this page are vitally important to every bearing user. For they illustrate the high quality, precision workmanship and close attention to engineering detail that go into *every* Bower bearing. Even more important, these Bower design features will give you significant bearing advantages such as reduced wear, longer bearing life and lower maintenance requirements. They've been thoroughly *proved* by extensive use in virtually every type of bearing application. If your product uses bearings—whatever it may be—specify Bower now. Or better yet, call in a Bower engineer while your product is still in the blueprint stage.

BOWER ROLLER BEARING COMPANY • DETROIT 14, MICHIGAN



● **SPHERICAL ROLLER HEADS ARE GENERATED TO THE CONTOUR THEY ACQUIRE IN THE COURSE OF WEAR.** This helps Bower bearings hold adjustment and pre-load longer and better. Normal running-in time is virtually eliminated.

● **HIGHER FLANGE PROVIDES A LARGE, TWO-ZONE CONTACT FOR ROLLER HEADS,** thereby reducing unit pressure. This exclusive Bower feature improves roller alignment, greatly reduces wear and practically eliminates resultant "end play."

● **LARGER OIL GROOVE GIVES POSITIVE LUBRICATION** at the critical point—where the roller head thrusts itself against the cone flange. Here Bower design provides a larger recess that holds a generous supply of lubricant—increasing efficiency and decreasing wear.

● **PRECISION RACES PROVIDE QUIETER, SMOOTHER OPERATION.** A Bower-developed grinding and honing process provides a micro-smooth surface of hard, crystalline base metal. In this way, close-tolerance precision is built-in to stay! No final adjustment is needed!

A COMPLETE LINE OF TAPERED, STRAIGHT AND JOURNAL ROLLER BEARINGS FOR EVERY FIELD OF TRANSPORTATION AND INDUSTRY

BOWER

ROLLER BEARINGS

SPHER-O-HONED

NEW IDEAL® SWIVELS

...lighter and stronger for faster, easier handling!

Every known feature for cutting operating costs has been built into National Supply's new line of Ideal Swivels. Besides greater stability in handling, minimum weight per rated capacity and a more compact design for maximum safety, these new Ideal Swivels assure continuous trouble-free service under severe operating conditions at minimum maintenance expense.

As an operator or contractor, you'll want to take a close look at these important features:

Reduced weight: Complete redesigning was employed to bring every model of Ideal Swivels down to minimum weight in relation to individual rated capacity. Use of high quality, high-strength components throughout have reduced both over-all height and weight to greatly facilitate handling.

Lower center of gravity: Centerline of the bail pins on the new "N" series of Ideal Swivels has been raised, thereby lowering center of gravity. This means greater stability in handling, makes connection of swivel "sub" to kelly easier and faster.

Streamlined exterior: The body of the new Ideal Series N Swivel is free from any dangerous projections. All bolts, nuts, pins and grease fittings are recessed to assure maximum safety to the derrick crew.

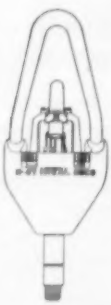
Fast wash pipe replacement: National's exclusive Uniflex Wash Pipe Box assembly is standard on all N series Swivels. An improved method for packing off the mud, the Uniflex assembly also features quick acting threads to speed replacement . . . is easily assembled by one man, and can be installed without removing gooseneck or hose connection.

Rapid hose coupling: Also standard in the N series Swivels is the Quick-Seal Hose Connection that speeds make-up of hose joint. Besides eliminating one hose connection member and minimizing mud leakage, the Ideal Quick-Seal Connection features larger quick acting threads and sealing elements to withstand rugged use.

Why not get complete details today? Review these and the many other features that Ideal Series N Swivels can provide your operations with the National Supply Representative or Store in your area soon. See for yourself how the new Ideal Swivel can cut your cost of drilling hole.

4 new IDEAL Type "N" Swivels

Ideal N-35
Depth: 3000
Range: 5000
Comparative
Dead Load,
Tons: 150



Ideal N-47
Depth: 4000
Range: 7000
Comparative
Dead Load,
Tons: 200

Ideal N-69
Depth: 6000
Range: 9000
Comparative
Dead Load,
Tons: 300

Ideal N-815
Depth: 8000
Range: 15000
Comparative
Dead Load,
Tons: 400

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First in supply service
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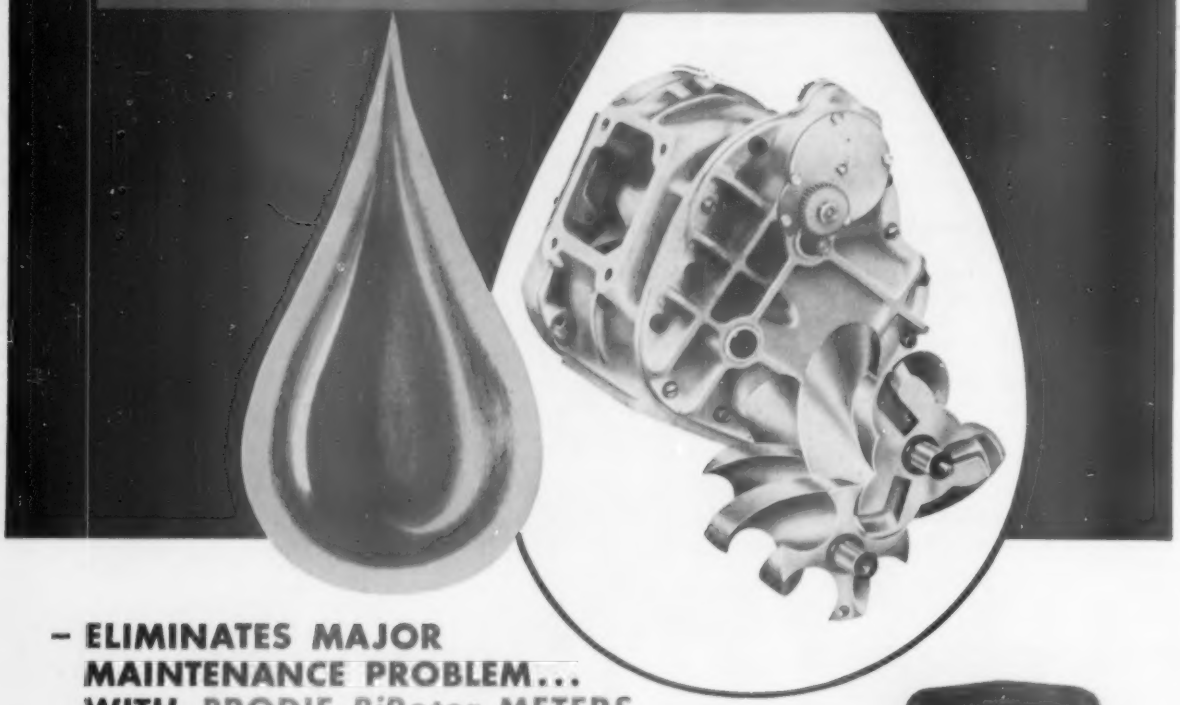
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

COMPLETELY SELF-LUBRICATED MEASURING ELEMENT



– ELIMINATES MAJOR MAINTENANCE PROBLEM... WITH BRODIE *BiRotor* METERS

- Bearings automatically lubricated by product handled
- Just two moving parts, with true rotary motion in direction of flow — no reciprocating parts or vanes
- Complete static and dynamic balance avoids vibration, reduces load and bearing wear to a minimum
- Positive displacement with no metal-to-metal contact in measuring chamber — frictionless liquid capillary seal

Thousands of hours of high sustained accuracy in installation after installation with lowest record of maintenance testify to the long life and trouble-free advantages of Brodie BiRotor self-lubricated measuring elements. What could be more fool-proof and wear-free than just two simple rotors with no metal-to-metal contact... and bearings that don't require time or attention for lubrication. Brodie BiRotor design offers extremely low resistance to flow with positive displacement accuracy. Before you select a meter for any petroleum measuring service, investigate Brodie BiRotors.

BRODIE BiRotor METERS

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REPRESENTATIVES WITH STOCKS AND SERVICE FACILITIES IN ALL PRINCIPAL CITIES

A heaping bucket every time!

WATCH THIS.....

1 Watch this amazing bucket action—just flip the direction lever to "Forward" and step on the gas

2 Digging in—the torque converter delivers smooth, steady power. Note the tread-marks—no wheel spin

3 Roll back the heaped-up bucket—tip-back action where it counts: *in the pile*

4 Lift the bucket clear, hold it level—that heaped-up load is well over a cubic yard of material

5 Back out—flip the lever to "Reverse" and step on the gas; no clutch, no gear-shift, no wasted time

6 Dump the load, back away, and hustle in for another heaping bucket—makes short work of loading a truck

You get a full bucket every pass with a MICHIGAN . . . and more passes every hour. Result: bigger yardage! For a real convincer, have a demonstration on your job—your MICHIGAN* dealer will arrange it. Let's make a date—send the coupon on your letterhead.

*A Trademark of Clark Equipment Company

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CLARK EQUIPMENT COMPANY 20
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448 Second St. • Benton Harbor, Michigan, U.S.A.

Have your dealer make a date to demonstrate the MICHIGAN Tractor Shovel

Name_____ Title_____

Firm_____

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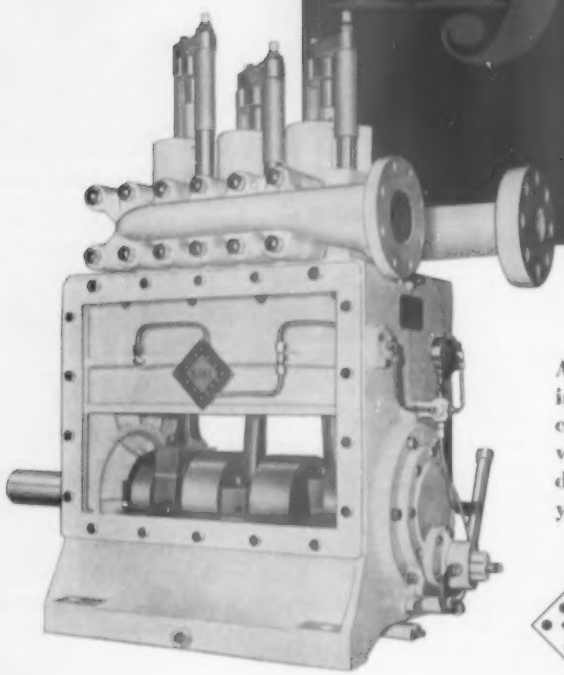
For CONSTANT PRESSURE

"Round the Clock"

INSTALL AN

Ajax PUMP

TP-4000 SERIES



IN YOUR RECOVERY OPERATION

Ability to maintain pressure in water-flooding is vital to efficient oil recovery at minimum costs. You get this dependable performance with the Ajax TP-4000 Pump because it is designed and built with your needs as the yardstick—by the makers of Ajax Engines with a worldwide reputation for reliability. ● Get the Ajax Pump facts—and you'll buy an Ajax Pump! *Write us for descriptive Bulletin 531 - - - see your Supply Man!*

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R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

THERE'S NO MAGIC ABOUT IT

...NEITHER ARE THERE ANY magical qualities in the ability to bring about successful on-stream completions when your process construction is handled by Procon.

To Procon personnel, the meeting of guarantees is an undivided responsibility . . . theirs alone . . . beginning the moment they are assigned to a new job . . . continuing throughout the construction period . . . ending only after the project has been completed to the customer's satisfaction.

It is this acknowledgement of responsibility which assures you of process construction that will meet your particular needs, whatever they may be. It is your guarantee that every detail, no matter how small or complex, will be carried out according to your specifications.

These are the qualities which result in satisfaction . . . your satisfaction . . . another reason for selecting Procon for your next process construction job.

PROCON *Incorporated*

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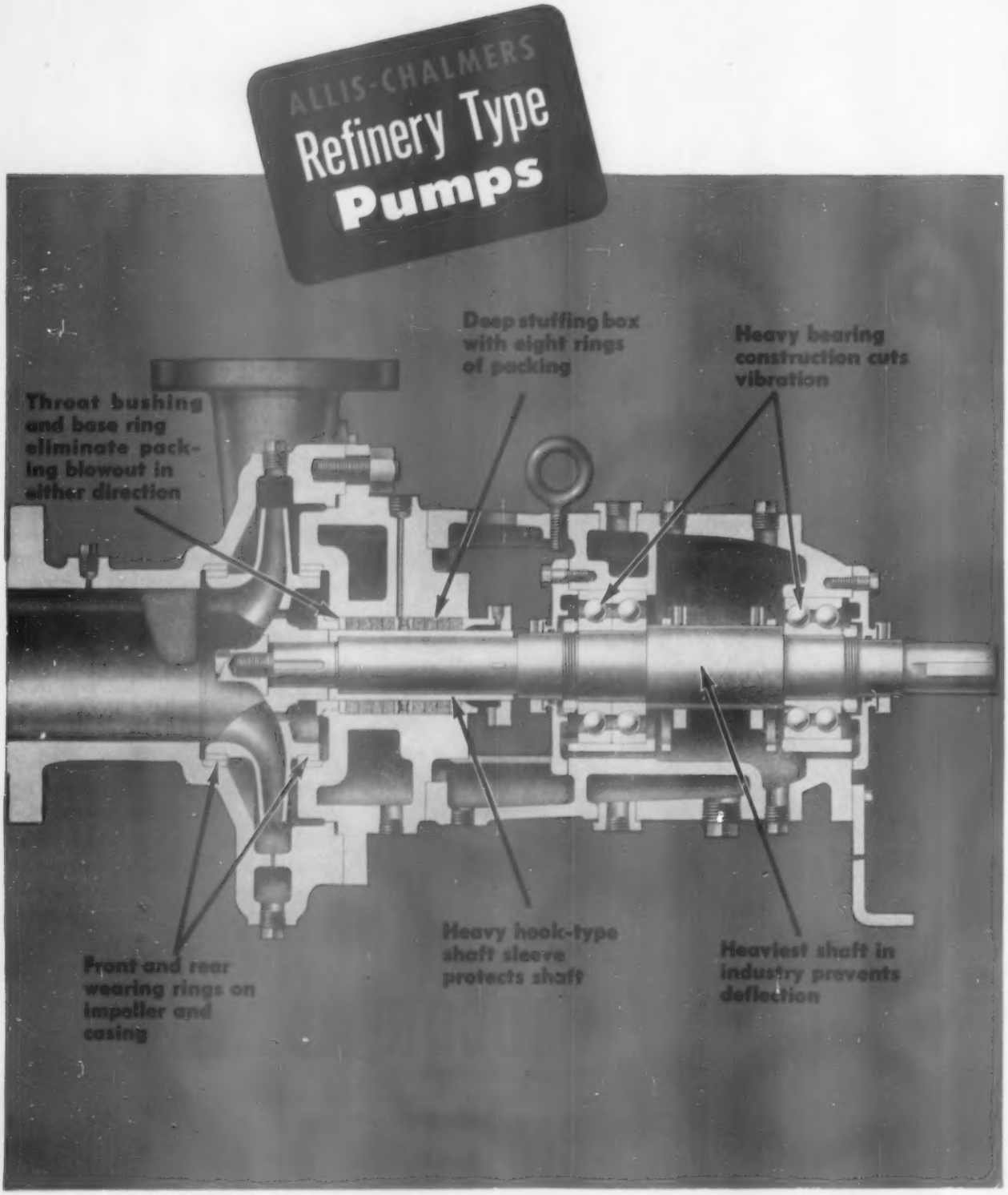
PROCON ®

EXTRA heavy-duty construction


ALLIS-CHALMERS
Refinery Type
Pumps
Deep stuffing box with eight rings of packing
Heavy bearing construction cuts vibration
Throat bushing and base ring eliminate packing blowout in either direction
Front and rear wearing rings on impeller and casing
Heavy hook-type shaft sleeve protects shaft
Heaviest shaft in industry prevents deflection

gives you service continuity

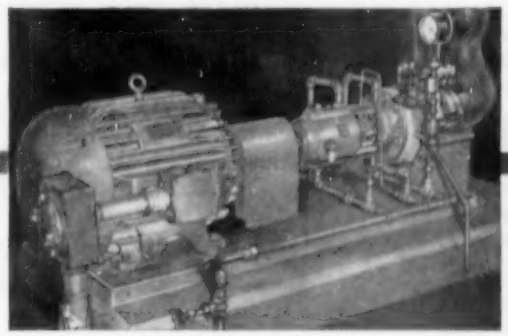
WHERE A STOPPAGE COSTS A FORTUNE, install Allis-Chalmers Refinery Pumps. These pumps have the stamina to keep going on the toughest applications for years without rest. Every construction detail, those shown here and many others, has been carefully engineered to provide ample reserves of strength and durability. Careful workmanship and expert application engineering make these pumps deliver all the reliability that is designed into them.

Wide Choice of Materials, Features

The Allis-Chalmers Refinery Pump can be fitted to suit your requirements exactly. Practically any material normally used in pumps may be specified. Stuffing box takes packing, mechanical seal or both. Cooling water or oil may be used in five separate places so you can select exactly the cooling arrangement for your particular needs. Suction may be at top or on end.

Get Complete Information and Engineering Help

Your nearby Allis-Chalmers representative will be glad to help you with your refinery pump problems. Or write for Bulletin 52B7775. Allis-Chalmers, Milwaukee 1, Wisconsin.

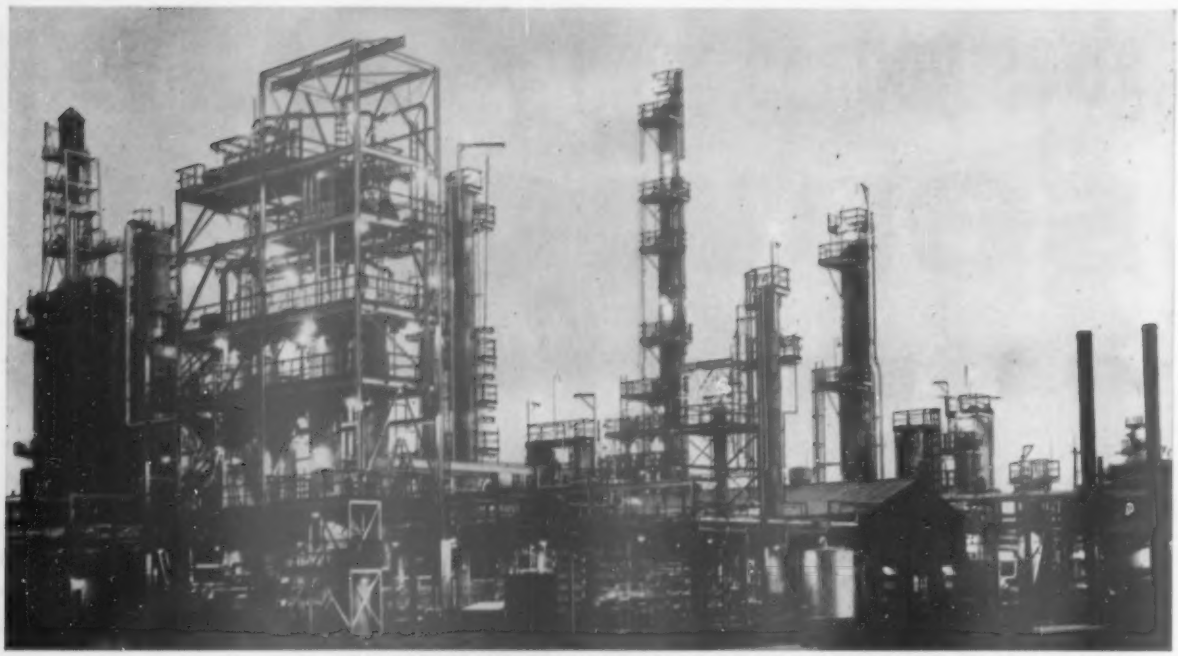


Save Engineering and Installation Time with an Allis-Chalmers Pump Package

Allis-Chalmers will supply a complete pumping unit — pump, motor and control — engineered to work together and with pump and motor mounted on a single base plate ready for installation. You save engineering time because you don't have to match components from different manufacturers. You save installation time because the unit comes to you already assembled. And, most important, you are sure that the components will work together to give you long life at low operating cost. The complete unit is covered by a single guarantee backed by Allis-Chalmers well-known customer satisfaction policy.

A-4333

ALLIS-CHALMERS



THIS NEW STANDARD OIL REFINERY at Mandan was dedicated October 2. Capable of refining 30,000 barrels a day, it is the first major oil refinery in North Dakota. It probably is the state's largest industrial unit, and is creating new jobs for many North Dakota citizens.

THE KEY TO BURIED TREASURE!

When oil is discovered, the words "buried treasure" quickly come to mind.

But oil underground is not true wealth until it is brought to the surface and refined into useful products, which are marketed. And without facilities to handle it above ground, the oil will remain locked beneath the surface.

In North Dakota, Standard Oil is providing a "key"—a new 30,000-barrel-a-day refinery at Mandan—which will help unlock nature's buried treasure. Service Pipe Line Company, a Standard Oil subsidiary, built the first crude oil gathering lines and crude oil pipelines in North Dakota. These lines supply the new refinery.

Gasoline and other products made at the refinery will be sold throughout North Dakota by Standard Oil agents and dealers. An additional volume of refined products will be sent through our new 200-mile pipeline from Mandan to Jamestown and to Moorhead, Minnesota. At Moorhead this new pipeline connects with other Standard Oil products pipelines serving the Midwest.

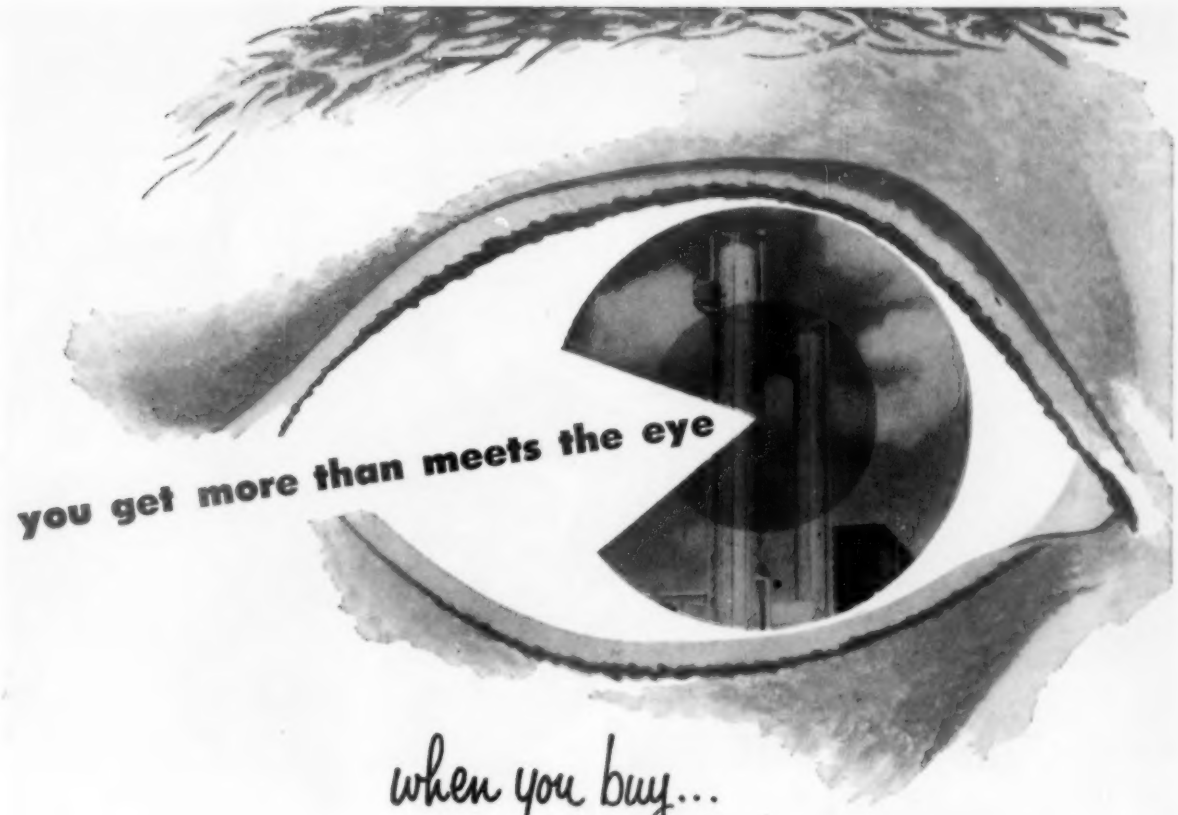
These important investments by Standard Oil and its subsidiary companies mean that more of North Dakota's buried treasure can be converted into usable wealth.

Standard Oil Company

(INDIANA)

EVEN AFTER OIL is discovered by drilling operations such as this one, it cannot be economically produced, refined and marketed without large investments in handling facilities on the surface. Standard Oil's new Mandan refinery and pipelines will help to increase production and distribution of North Dakota oil.

A STANDARD OIL pipeline will take finished products to the Standard Oil terminal at Moorhead, Minnesota (above). From there they can be shipped through Standard Oil pipelines to other sections of the Midwest where Standard Oil agents and dealers provide their customers with uniform, high-quality products.



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Yes! You get *more* than drums and tank cars of the best gas-treating chemicals . . .

YOU GET . . .

- the results of CARBIDE's 20 years' experience in their manufacture.
- the service of CARBIDE's field representatives.
- the assistance of CARBIDE's laboratories where specialists devote a great amount of time to work on customer service problems.
- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

REMEMBER: You get more than chemicals when you do business with CARBIDE.

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"The right wire rope? That's *EASY* every time!"

It's a cinch to pick the right wire rope for top equipment performance . . . and it pays off! Roebling's new catalog has a section devoted to rope for the oil fields . . . shows at a glance the best rope for each purpose and gives you a simple, unique code number system which for the first time in history *positively* identifies the desired rope.

* * *

Write for your copy of the new "Roebling Wire Rope Recommendations and Catalog". And remember that the Roebling Field Man at your nearest Roebling office is always available to help find the special wire rope to solve your problems. District offices at Cleveland, Denver, Houston, Los Angeles, Odessa, Tulsa and Chicago.

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DESALTING EFFICIENCY FACTOR: SIMPLICITY

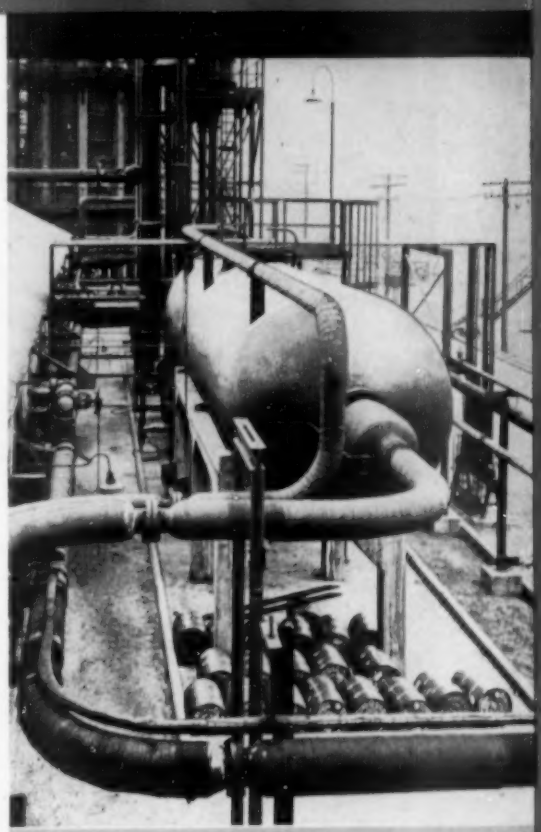
One of the most important features of Tretolite Desalting is SIMPLICITY. Here are three ways it helps you get more efficient desalting.

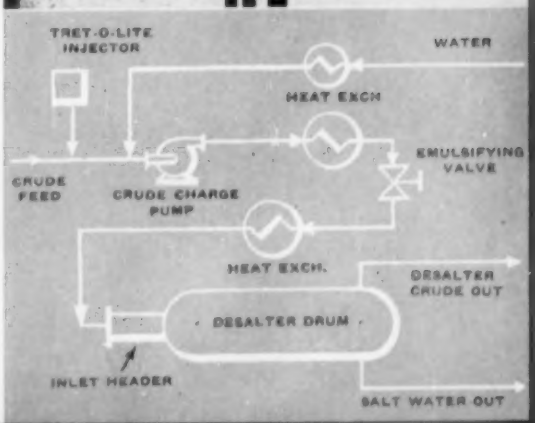
1. **LOWER INITIAL COST** In a Tretolite chemical desalting plant, Tret-O-lite does the work. The Tretolite-designed flow system promotes ideal coalescence and separation of the oil and water phases. The desalting is effected rapidly and easily.

2. **LOWER OPERATING COST** Tretolite desalting utilizes one agent only, chemical, to effect the salt removal demulsification. The efficiency of Tret-O-lite desalting agents permits effective operation with minimum chemical requirements. No secondary treating agency is required.

3. **LOWER RESIDUAL SALT** In spite of the low initial and installation cost, Tretolite salt removals are in the 95 to 100% range. Residual salts, solids and other impurities are held at minimum. The water bleeds are consistently clean. Tretolite desalting engineers will gladly furnish you with performance data relative to crudes similar to those charged in your refinery.

Why not ask for a Tretolite proposal on your next desalting problem?





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Chemicals and Services for the Petroleum Industry

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GO EVERYWHERE
Rough terrain and severe climate—even burning desert sands—present no obstacle to Rogers trained crews.
Experience in every type of exploration, both foreign and domestic, gives Rogers crews the experience and the adaptability to handle your geophysical program accurately and efficiently.
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What you want
When you want it
At the right price

ONE of our experienced stainless men will be glad to work with you on stainless steel selection problems so that you can use the most effective and economical grades and sizes. And we follow through from design to delivery to make sure that you get exactly the steel specified for the job. With complete stocks of dependable USS Stainless Steels, fast delivery service, and competent, thorough technical assistance, we offer a real cost-cutting combination.

Whatever your demands, it'll pay you to call on U. S. Steel Supply the next time you need stainless steel. Our unusually complete stocks of USS Stainless include bars—rounds, squares, hexagons, angles, channels, and the widest selection of grades, sizes and finishes of sheets and strip available.

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Please send me, without obligation, your literature containing complete information on your Stainless Steel stocks and service.

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City.....State.....

They Say—

I.P.A.A. Wants Action

"No further time or study is needed . . . to recognize that unsound conditions threaten future United States oil supplies and the national security. By each and every accepted standard, oil imports have continued at excessive levels . . . Proper corrective action can and must be taken. It should not be delayed. . . .

"The latest announced import programs indicate average imports of 1,065,000 bbl. daily for the last 6 months of this year, representing a slightly greater volume than either the preceding 6 months, or the year 1953. The principal increases in projected imports are in shipments of crude oil into the area east of California, where foreign oil has supplanted domestic production to the greatest extent. . . ."

W. M. Vaughey, president of the Independent Petroleum Association of American, and W. L. Stewart, chairman of the I.P.A.A. import policy committee, in a joint statement issued after a meeting of the committee.

Oil in New Guinea, Australia

"I remain optimistic about the prospects for oil in Papua and western Australia and, taking a long view, in Queensland where it seems to me much more regional geological and geophysical work is required.

"Taking into consideration the geological conditions in Papua around Omati and the known presence of oil in seepages and outcrops of rocks suitable for oil occurrence as well as the technical and financial resources of the companies concerned, it would be surprising indeed if the efforts they are now making were not rewarded by success."

Dr. Harold G. Raggatt, Australia's Secretary of the Federal Department of National Development, in a recently published paper.

Source of Highway Funds

"We estimate that 69 per cent of all revenues applicable to highways in 1954 will come from the state governments. Another 22 per cent will come from the counties and cities, and 9 per cent from the federal Government.

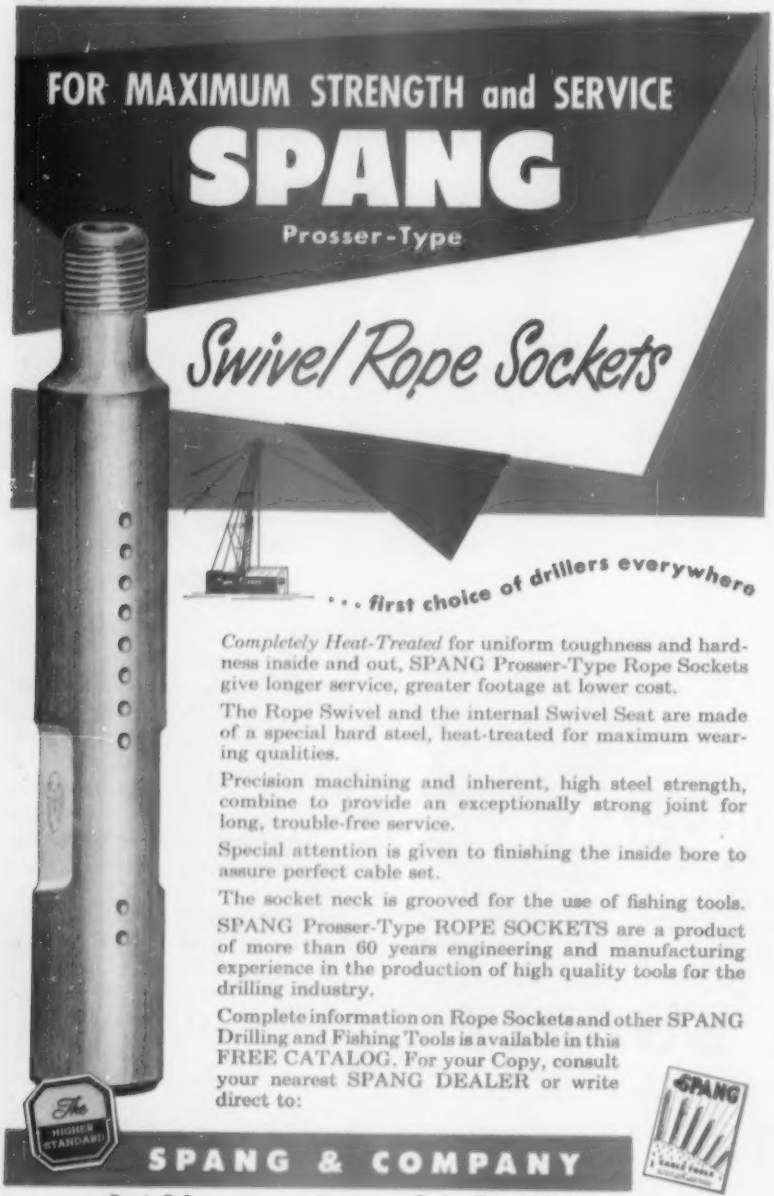
"These vast amounts are conservatively expected to be sufficient to permit capital expenditures of about $50 billion during the course of the next 10 years. This sum . . . is in no way dependent upon receipts from federal excise taxes on motor fuels, vehicles, and parts."

Robert M. Murray, Jr., undersecretary of commerce for transportation, in an address to the National Association of Motor Bus Operators.

Two Per Cent Rise Forecast

"There has been an over production in recent months, particularly of gasoline, and product prices have weakened materially. . . . Adjustment in refinery runs and adjustments in the yields of the various products . . . should correct this. The upturn in general business which we expect during the latter half of this year, plus the expectation of normally cold winter weather as compared with the abnormally warm winters we have had for a number of years, should lead to progressive improvement in industry operations from current levels.

"For the year of 1954 . . . we expect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SPANG
Prosser-Type
Swivel Rope Sockets
. . . first choice of drillers everywhere
Completely Heat-Treated for uniform toughness and hardness inside and out, SPANG Prosser-Type Rope Sockets give longer service, greater footage at lower cost.
The Rope Swivel and the internal Swivel Seat are made of a special hard steel, heat-treated for maximum wearing qualities.
Precision machining and inherent, high steel strength, combine to provide an exceptionally strong joint for long, trouble-free service.
Special attention is given to finishing the inside bore to assure perfect cable set.
The socket neck is grooved for the use of fishing tools.
SPANG Prosser-Type ROPE SOCKETS are a product of more than 60 years engineering and manufacturing experience in the production of high quality tools for the drilling industry.
Complete information on Rope Sockets and other SPANG Drilling and Fishing Tools is available in this FREE CATALOG. For your Copy, consult your nearest SPANG DEALER or write direct to:
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For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.

PETROLEUM CHEMICALS DIVISION

NEWS

October ★ One of a Series of Interest to the Petroleum Industry ★ 1954

No Country Like Our Country!

Each year, during Oil Progress Week, Americans can proudly celebrate the fact that in no other country are the people so well supplied with products and services that can only be made available through a great, progressive and competitive oil industry.

3 New Additives Recently Developed by Du Pont

Progress in the development of new petroleum additives has been rapid at Du Pont during the past year and a half.

The most recent of these is Lube Oil Additive 564. Now, for the first time in the history of motor oil additives, Lube Oil Additive 564 provides a viscosity index improver with effective detergent-dispersant action to overcome sludge problems caused by continuous low-duty stop-and-go engine operation. Its detergent action is also effective under medium and heavy-duty conditions. And Lube Oil Additive 564 is ashless, a unique quality in a detergent.

What's more, this new additive is highly effective in low concentrations and can, therefore, be used at reasonable cost. It is expected that it will prove especially valuable in motor oils used in urban car and delivery truck fleets, as well as in the average driver's car.

Another effective new additive recently announced by Du Pont is Estersil GT—a water-repellent silica grease thickener. This additive makes possible multi-purpose greases with unusually high shear and thermal stability.

Du Pont Fuel Oil Additive No. 2, announced only a little more than a year ago, has already proved its worth as a stabilizer and dispersant for both heating and diesel oils.

SERVICE!...

It has become a symbol of the Petroleum Industry . . . and it is the key policy of the Du Pont Petroleum Chemicals Division

In the language of the American motorist, "petroleum products" and "service" have become almost synonymous.

When the motorist needs gasoline, he looks for a *service* station. When he buys motor oil or chassis lubrication, he refers to his purchase as having his car "serviced." During the past half century, the tremendous growth of the petroleum industry has been built on *service* . . . and the public has benefited richly from it.

A UNIQUE SERVICE for refiners and marketers is the quarterly Du Pont Motor Gasoline Survey. It is based on hundreds of service station samples collected by Du Pont representatives every three months.

At Du Pont, we have designed our services in connection with additives to be outstanding, too . . . and many of these are the kind that stimulate your business at the service station and consumer levels.

Marketing Services

Du Pont Petroleum Chemicals Division services cover a wide range of oil company activities. In marketing, for example, the Du Pont services are designed to fit in with the individual company's own sales promotion programs . . . to help them get *extra* mileage out of their promotion investment.

The recent extensive survey of consumer gasoline buying habits is one example of a Du Pont service that can be equally valuable to every oil company. And the Du Pont brand name, lube oil, and chassis dynamometer presentations can be easily tailored to meet individual marketing requirements. In addition, Du Pont also supplies marketers with a wide variety of dealer-training aids.

Technical Services

As oil technology progresses, new technical problems have a way of constantly cropping up. Since the solution to technical problems generally comes easier and faster when extra information is available, Du Pont makes available a number of widely varied technical services to assist refiners.

For example, our five well-equipped regional laboratories, conveniently located near the major refining areas of the country, work exclusively on oil and automotive industry problems. And the Du Pont fleet of fuel test cars is often called in to help refiners solve

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

CONTINUED "Service"

road performance problems. Another unique Du Pont service is the engineering of tetraethyl lead blending plant design and construction.

In addition, the Du Pont Company continuously carries on basic research of value to the petroleum industry . . . and publishes many of the results in technical papers for the benefit of the whole industry. Also, Du Pont technical representatives are always available for consultation on manufacturing problems.

Safety, too!

In spite of the many occupational hazards which refiners must face daily, the industry has established an admirably high safety record throughout the years.

To help you maintain this fine record, the Du Pont safety and medical

DU PONT REPRESENTATIVES work closely with refinery blending plant personnel on tetraethyl lead handling problems.

services include stand-by personnel for tank-cleaning operations. Also a variety of interesting talks as well as worker examinations by doctors specializing in tetraethyl lead hazards. In addition, aid is given in the design of special safe-handling apparatus for blending plants and, finally, a broad range of personnel-training aids is also available.

In Addition . . .

Du Pont offers many services of a general nature. The Quarterly Gasoline Quality Survey is one example. And to aid the industry in its over-all public relations activities, Du Pont has contributed the famous "Magic Barrel" show and a number of educational films such as, "Pipeline on Wheels," "It Never Rains Oil," and What Makes A Gasoline Good."

Are *you* taking full advantage of these helpful services? If not, you can easily request them through any of our regional offices listed below.

Still Rolling!...

"MAGIC BARREL" SHOW TELLS UNIQUE PUBLIC RELATIONS STORY TO MANY MILLIONS

Our modern petrochemical industry makes "Aladdin's Lamp" look like a piker.

And *millions* of Americans are becoming increasingly aware of this through seeing the Du Pont-designed "Magic Barrel," which is currently being presented by individual oil companies and the OIIC.

During the past year, the "Magic Barrel" has starred on more than 50 different television programs, playing to many million people. Approximately 300,000 have seen the show through lecture presentations to civic groups, service clubs, luncheon meetings, employee and customer gatherings.

Your future customers are learning more about the oil industry from it, too. By the end of this year, it is planned that the "Magic Barrel" will have been seen by every child in the City of New York school system. And it is also being shown to thousands of other school children and college students across the country.

To get the project rolling initially, Du Pont designed and supplied the original barrels, and furnished many of the oil-based products in the show. There are now 148 "Magic Barrels" on the road. Du Pont also helped in the training of the more than 600 oil industry employees who present the show.

Now—it's the "MAGIC SUITCASE"

The women, it seems, are not to be outdone when it comes to using ingenious products made from petrochemicals.

CONNIE MOON, originator of the "Magic Suitcase" and women's program director for the OIIC, is shown here demonstrating a dramatic dye-bath with oil-based fabrics and dyes.

The OIIC has come up with a new demonstration-lecture which combines entertainment with the story of oil in a woman's world. Called the "Magic Suitcase," the demonstration is built around a small suitcase containing 35 oil-based products. They range from shimmering fabrics to sunglasses, perfumes and lipsticks.

The speaker, moreover, appears before her audience "dressed in oil"—in clothes made of "Orlon" acrylic fiber, "Dacron" polyester fiber, nylon, or some other new fiber created with oil and modern chemical science.

During Oil Progress Week and throughout the coming year, the "Magic Suitcase" will be shown to women's clubs, PTA meetings, church and other group gatherings.

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A-8027

Printed in U. S. A.

the oil consumption to be at least 2 per cent higher than last year."

M. J. Rathbone, president of Standard Oil Co. (N.J.), in remarks made during the National Association of Manufacturers' radio forum "It's Your Business."

International Oil Review

". . . I should like to summarize the international oil position as I see it. On the plus side must definitely be placed the successful conclusion of the recent Iranian oil negotiations . . . the continued growth in the free-world economy generally . . . that we have plenty of oil in sight. . . .

"On the minus side . . . are some of the byproducts of the increased nationalism in many countries. . . .

"The question of imports of oil into the United States is a recurrent one . . . I cannot regard it . . . as either a major plus or minus. . . . Total imports of crude oil into the U. S. constitute at the moment about 8½ per cent of domestic demand and represent about 12 per cent of total free-world production of oil outside the U. S. Personally, I think imports of oil . . . are moderate in relation to all the circumstances, particularly in view of the fact which I cited earlier—that the U. S. has less than a fourth of the world crude oil reserves, yet produces over half the world's oil and uses more than that. . . .

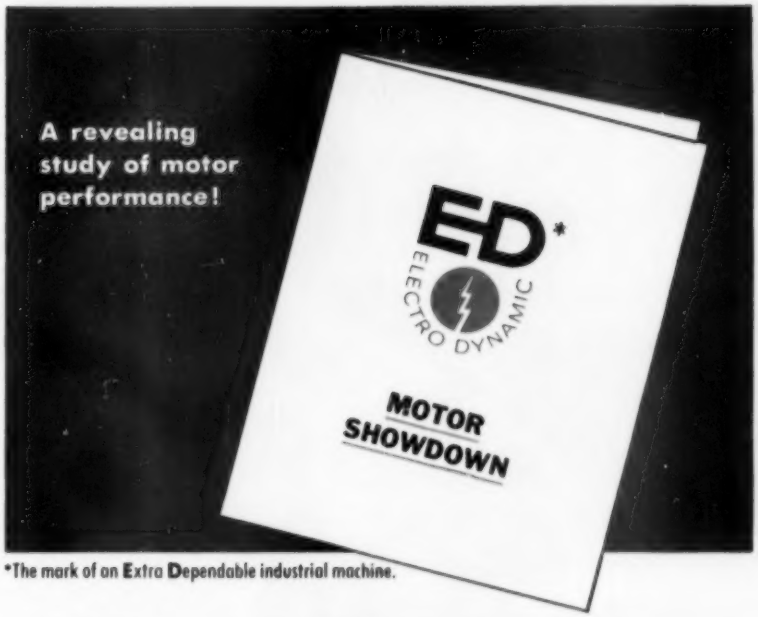
"If we force the producing countries to find other markets for their oil now, we can't expect to have it available to us when we need it. . ."

B. Brewster Jennings, president of Socony-Vacuum Oil Co., Ltd., in an address before the Los Angeles World Affairs Council.

A Trans-Canada Milestone

"Signing of the contract with Northern Natural is an important milestone in the development of the Trans-Canada system. New gas reserves are being proven up at a current rate of about 1,300,000,000 cu. ft. a year and this assures supply of all the gas we estimate can be sold in our country for years to come. Alberta has set aside adequate reserves for its own present and future needs. The addition of this market will strengthen the Canadian natural-gas industry."

N. E. Tanner, president of Trans-



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Canada Pipe Lines, Ltd., in a statement issued after Trans-Canada signed a contract to sell gas to Northern Natural Gas Co.

"High Time for Action"

"When we moved from a net exporting nation of petroleum and its products into the position of a net importer . . . it seems crystal clear to me that we are allowing domestic production to be supplanted by foreign oil to a degree that threatens our domestic oil-producing industry . . .

"Certainly some sound business statesmanship is indicated as being necessary. It is now high time for action on the part of the importing companies instead of mere words . . ."

Lt. Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission, at a meeting in Atlantic City of the National Petroleum Association.

CALENDAR OF EVENTS

OCTOBER

18-20 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.

21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

21-23 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

22-24 Golden Trend Oil Exposition, County Fairs Building, Pauls Valley, Okla.

24-26 Independent Petroleum Association of America, annual membership meeting. Mayo Hotel, Tulsa.

25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.

26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.

26-29 National Clay Minerals Conference, Rice Institute campus, Houston.

28 Canadian Petroleum Association, Saskatchewan division, annual meeting, Hotel Saskatchewan, Regina.

29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

NOVEMBER

1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.

3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.

4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.

4-5 Society of Automotive Engineers, national fuels and lubricants meeting Mayo Hotel, Tulsa.

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If you are the average cooling tower owner, you do not test your purchase. In fact, Mr. Average Owner knows less about the actual performance of his cooling tower than his wife does about the interior of the melon to which she has applied the "squeeze and sniff" test. True, cooling towers are purchased for a specified performance; but the difference between "specified" and "actual" is sometimes astounding and only a test will tell.

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A New Angle..

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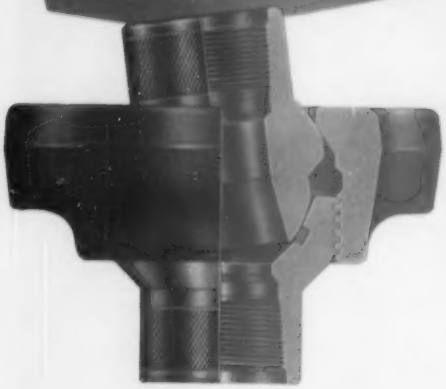
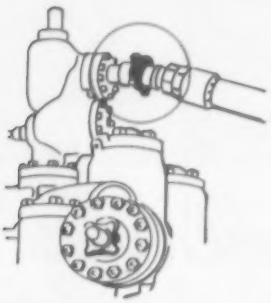


FIG. 603
6000 p.s.i.

• We have designed a number of important advantages into this new WECO Mis-Aligning Union that make it superior in sealing, service and durability.



1. 15° Mis-Alignment simplifies make-up.
2. Ball and Cone seat assures perfect sealing contact. "O" ring in female sub protects seat against corrosion and abrasion—is not essential to sealing.
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4-5 Third Annual Instrumentation Conference, School of Engineering, Louisiana Tech, Ruston, La.
4-6 Air Pollution Control Association conference, Biltmore Hotel, Los Angeles.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
8-9 Gas Measurement Institute, Legion Hall, Liberal, Kans.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.
17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.
18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.
18-19 Ninth Midwest Quality Control Conference, Society for Quality Control, Dallas.
18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.

28-Dec.
3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.
2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.
3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

1955

JANUARY

17-18 Kansas Oil Men's Association, annual convention, Baker Hotel, Hutchinson, Kans.
26-28 Symposium on instrumentation for process industries, A. & M. College of Texas, College Station, Tex.
27-28 American Chemical Society, symposium on hydrocarbon chemistry, Rice Hotel, Houston.

FEBRUARY

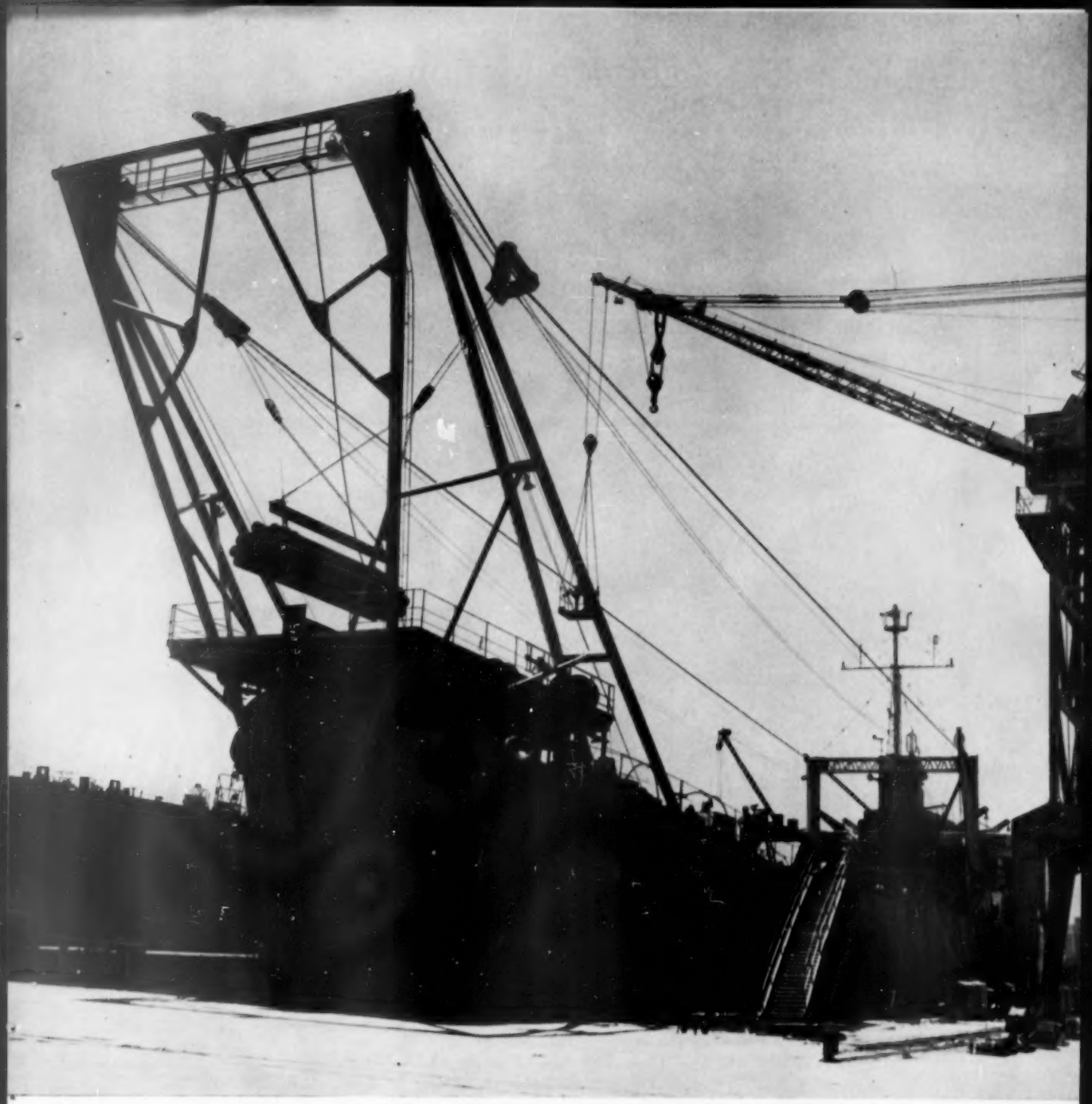
14-16 Rocky Mountain section of A.A.P.G., annual regional convention, Billings, Mont.
16-18 National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.
25 National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

4 Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.
7-11 National Association of Corrosion Engineers, Palmer House, Chicago.
24-25 American Gas Association, gas supply, transmission, and storage conference, Wm. Penn Hotel, Pittsburgh.

JUNE

16-18 Interstate Oil Compact Commission, Denver.



Wire Rope at Work—It's easier now to probe for oil beneath the ocean floor. When the offshore platform is serviced by a tender like this one, equipped with a wire rope cableway, the handling of equipment and supplies becomes a quick, simple matter. The system shown here has done away with many problems that formerly slowed up the transfer of loads from tender to drilling platform.

Bethlehem wire rope and strand are used throughout this overhead cableway, a rigging designed for 10-ton loads. The skyline consists of 237 ft of 2½-in. strand. The load, travel, and return lines are wire rope and are 410 ft, 275 ft, and 463 ft in length respectively. This is one of the newest oil-country uses for Bethlehem rope and strand, which are available for every type of service in the petroleum industry.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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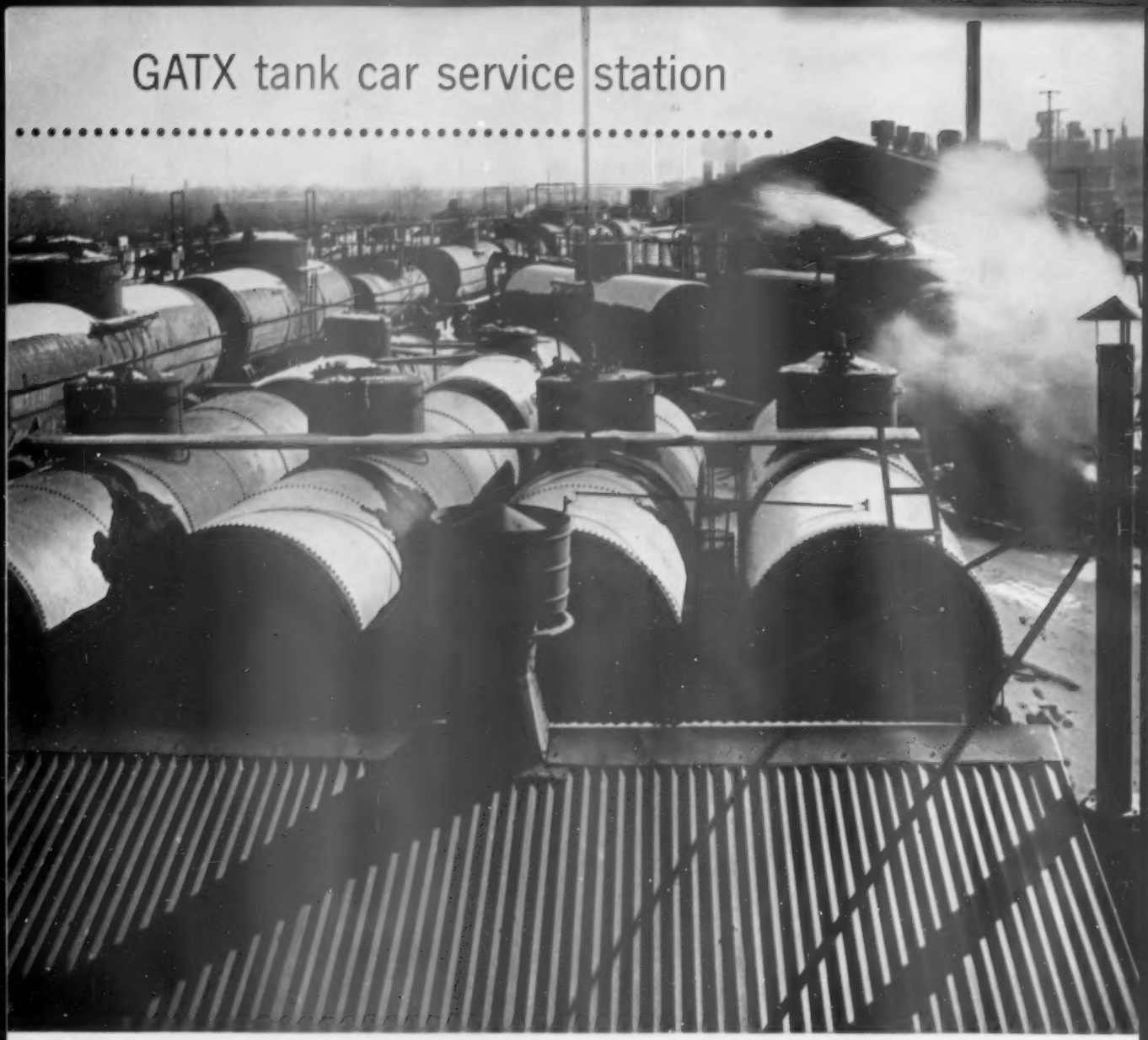

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TULSA, OKLAHOMA

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JOURNALLY Speaking

We Get Around

THERE'S plenty of proof that the Big Yellow Book gets around and is read, but a pump manufacturer recently got a wholly unexpected response to his ad in our pages.

It was a letter from a poor woman in the Netherlands West Indies asking his help in selling her hand-worked linen towels and kerchiefs as Christmas gifts in the United States. In heavily Dutch-flavored broken English she explained that she felt she could write to him as a friend because she read his name and address in The Oil and Gas Journal.

This isn't exactly the kind of response our advertisers expect to get—and usually do get—from their ads. This manufacturer would have preferred an order for a shipload of pumps. But he got such a kick out of the letter and the fact that his name is seen in faraway places that he sent a copy of the letter to us as a demonstration of our depth of penetration.

Tubeless Future

TUBELESS tires, their manufacturers say, are here to stay, and within a few years inner tubes will be a thing of the past, to be found only in automotive museums along with running boards and carbide lamps.

Doubtless that is progress, but do the tire makers realize that elimination of the inner tube is going to cause a drastic revolution in the American way of life?

Holding air in a vehicle tire is only the initial use of an inner tube, and sometimes only a minor and incidental one. After serving this original function, the average inner tube passes on, often much patched, to a wide range of general utility.

For one thing, we don't see how the next generation of children will learn to swim without the aid of old inner tubes. A generous supply of lightly inflated inner tubes is always to be found around beaches, docks, and swimming holes, where they serve admirably as economical life preservers and give countless middle-aged ladies a sense of security that enables them to wade out to armpit depth.

The world's chief supply of sheet rubber for farm and home use will disappear with the inner tube. Every do-it-yourself hobbyist has an old inner tube hanging conveniently in his garage or workshop, from which he can carve hunks for an improvised washer, boot patch, or pad. A piece of inner tube will stop a rattle in a jalopy, weatherstrip a door or window, make a spring for a screen door, provide hinges for a box lid, patch a hot-water bottle, protect a boat gunwale, pad a mallet head, keep a rainspout from splashing, deaden a door bell, absorb the vibration of mechanical equipment, and keep a bookend from skidding on a desk top. Cross-sections make big rubber bands.

The world is going to miss the inner tube. And what will small boys do for slingshots?

Notes from All Over

A NEW well in North Dakota is the Stanolind 1 New Year Many Ribs . . . one of the few well names of non-Scandinavian origin noted in that state . . . it's on an Indian reservation, and we'd guess the landowner was born during a New Year's Day barbecue. Oil-men-historians are so rare that one has been called out of retirement to write a history of his company . . . he's Roy D. Packard, who not only lived 50 years of history with Standard Oil Co. (Ohio) but is a nationally recognized authority on the history of Abraham Lincoln. A night-flying mud hen in California knocked a driller into the derrick cellar . . . the driller recovered, the mud hen didn't . . . anything can happen in the oil business. A California oil firm discovered that it had built its home office building smack on top of an oil pool . . . had to put rigs on the lawn and drill directionally to get under the building . . . who recalls that famous lecture about "Acres of Diamonds?"

—Henry D. Ralph.

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Dr. Coal writes a prescription for gas

A CURIOUS mixture of free competition and rigid federal regulation is proposed for natural gas by the bituminous-coal industry.

In recommendations to the President's cabinet commission now studying fuels industries, the coal interests advocate legislation to free gas producers from Federal Power Commission jurisdiction and allow gas companies the current market value of gas whether produced by themselves or purchased from others.

At the same time the coal people want new legislation to give FPC authority to impose end-use control that would eliminate much competition of natural gas with coal, to regulate gas imports and exports, to establish minimum prices for gas, to take jurisdiction over direct sales of gas to consumers, to require that natural gas be reserved for "higher purposes," and to require that gas pipelines be made common carriers and be forbidden to transport their own gas.

NOW THERE'S A FINE PROSPECT. The price of gas would be free to rise to anything its sellers could get for it in a competitive market. But at the same time the Government would circumscribe its markets and prevent gas from being used for any purpose that could be served by another fuel.

Very generous indeed, this half-slave-half-free status offered by gas' competitor. The gas industry is invited to jump from the frying pan of price control into the fire of use control. As badly as gas men want to get out from under regulation of production and field prices, they are not apt to pay this price.

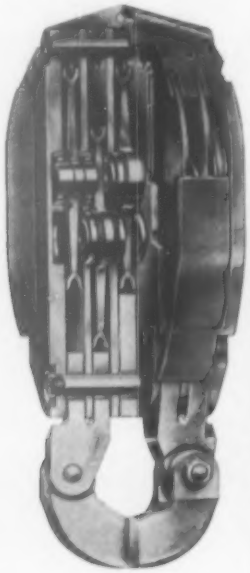
But at least the coal people now recognize that much of their trouble is due to arbitrarily depressed prices for gas, prices held well below the value of gas compared with other fuels.

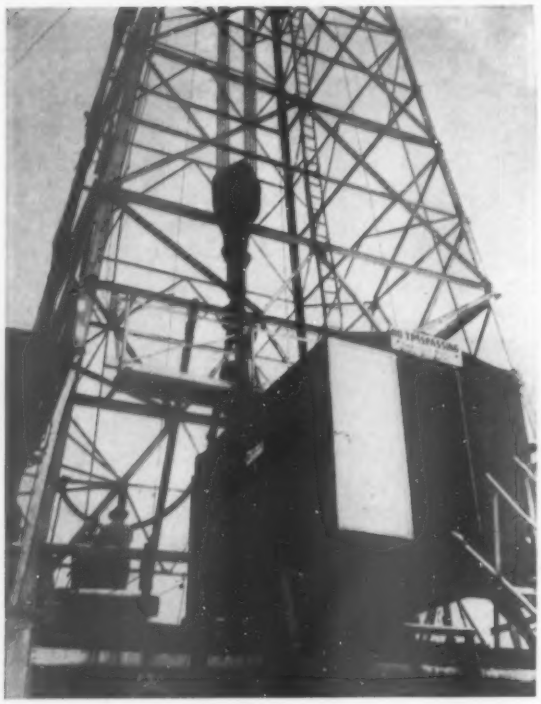
LESS, NOT MORE, REGULATION of gas will restore the balance of competition among energy sources. Gas should be freed of all regulation except in its strictly utility aspects, that is, franchised transportation and distribution. Then gas prices would find their economic level, and as they rose in response to demand, gas would be less of a competitor with coal, fuel oil, and electricity for many purposes.

End-use adjustment of gas will come as a result of competition if competition is free to function. Users of gas for "higher purposes" will pay more for it than for other fuels. This will stimulate sellers to develop more of these better-paying markets and to abandon such "inferior" uses as dump sales for boiler fuel.

The coal people are half right, the victims of muddled thinking. They are right in concluding that free price competition will give everyone a fair field; wrong in seeking a different set of shackles on a competitor. Competition should be free all around.

Take a look at Skelly Oil Company's Well Caylor #5, Lea County, New Mexico. This photograph was taken at the time Makin Drilling Company men were drilling at 14,153 feet. The remarkable ability of America's oilmen to produce has been aided by outstanding developments in equipment . . . such as the 88" traveling block, a product of Regan Forge & Engineering Co., San Pedro, Calif.





14,153' String Safely Handled By Regan 88" Traveling Block

How Steel Containing Nickel Strengthens Vital Parts

Here's the way Regan builds dependability into traveling blocks.

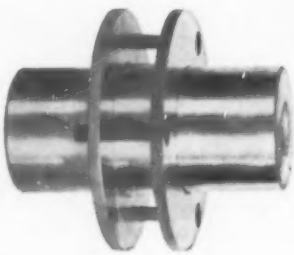
Aware that handling a long string of pipe is tough on cable, Regan engineers also know it's tough on sheave pins and bearings in the block. When these fail, long and costly delays are the result.

To insure against failure, Regan makes these parts from nickel alloy steel.

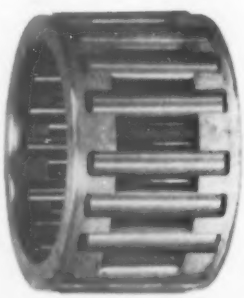
When case-hardened, this nickel alloyed steel provides a hard, wear-resistant, non-spalling surface. And from inside, the surface is supported by a strong, tough core that resists shocks and overloads. Another advantage, nickel alloy steel responds to heat treatment with a minimum of distortion in the manufacture of these parts.

You'll find this grade also used for slush pump cylinders, bit cutters, tool joints, reamer cutters and the like.

When you face a metal problem, let us help you make a selection that will meet your specific requirements. Send us details of your applications, for our suggestions.



Safety is built in. Hardened to 60-63 Rockwell, sheave pins, like this one taken from a Regan traveling block, combine the stamina and wear resistance needed for ample safety factors.



Smooth operation results from utilizing this type of bearing retainer and roller assembly. Regan specifies nickel alloy steel for race rings, bearing retainers and roller assemblies.

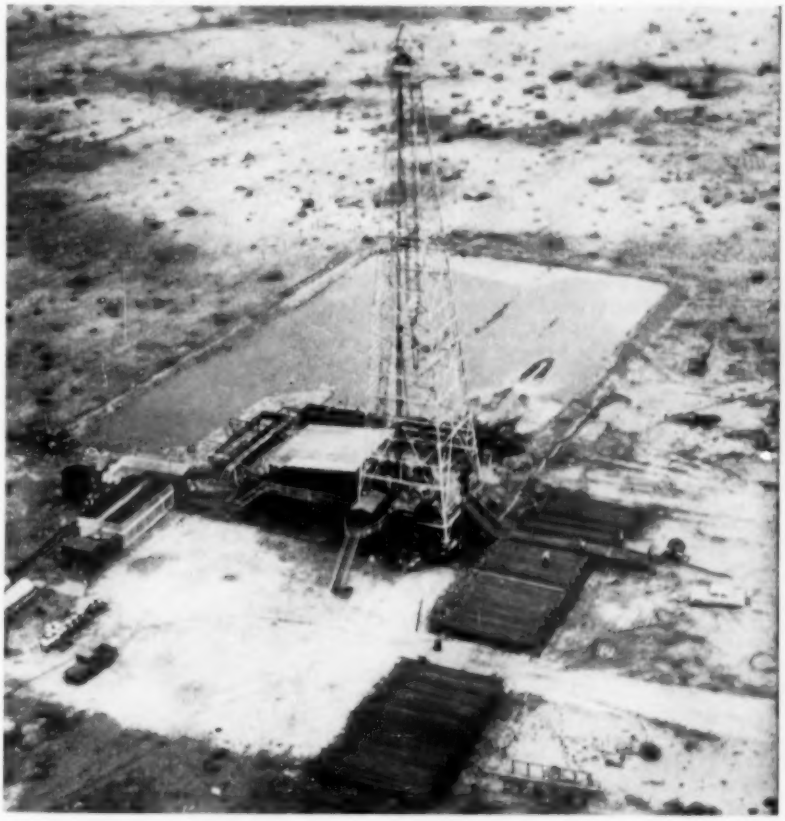
INCO
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

THIS WEEK... ...IN THE NEWS

OFFSHORE — Record-smashing bids up to $6 millions offered for tracts off Louisiana as Government leases first blocks in outer Continental Shelf. . . . Forest Oil makes top bid on single tract at $6,100,000, but Gulf corners 23 separate tracts of 115,000 acres for total of $34 millions—more than a quarter of the $129 millions offered Department of Interior in sale. . . . ¶New "cradle" to increase operating depth of drilling barge being built for Penrod Drilling Co. . . . Conventional barge fits into cradle as in a drydock and then integrated unit is submerged for drilling. . . . Unit allows barge to drill in depths up to 35 ft. . . . ¶Stanotex spuds new wildcat in gulf off Kleberg County, Texas. . . .

NATURAL GAS—Survey shows natural-gas producers are making fewer sales contracts with pipelines. . . . They hope confusion over government control may be cleared up within a few months. . . . Pipelines not pinched, but worried over escape clauses in existing contracts for gas. . . . ¶American Gas Association says common stock in gas companies and transmission firms has jumped more than 25 per cent in past year. . . . ¶Phillips board chairman takes issue with A.G.A. president's prediction that $4 billions will be spent by 1957 to meet increased gas demands. . . . K. S. Adams says it may have once been a good forecast, but not since Supreme Court decision in his company's case. . . . ¶Southern California Gas Co. president predicts California will need more out-of-state gas supplies to meet demand of increased population before 1960. . . .



THE FOURTH ELLENBURGER discovery in a chain of strikes between Headlee and Pegasus fields in West Texas was made by this heavy-duty standard rig at Forest and Cities Service 1 Dora Roberts B-1. The well has been completed with a potential of 1,417 bbl. daily and the rig will be moved to a new location as a southwest offset, which will be the same operator's 2 Roberts B-1. Turn to page 79 for a review of the activity in the area.

EXPLORATION—Grady County, in southwestern Oklahoma, becomes second most active drilling area in the United States. . . . With 70 rigs operating, Grady is surpassed only by Andrews County, Texas, with 75 rigs. . . . ¶New Ellenburger discovery is made in fast-developing area in Midland and Ector counties, West Texas. . . . ¶Second fishing job in recent weeks delays operations at Reeves County test, the deepest hole ever drilled in Texas. . . .

INTERNATIONAL — New Australian refinery prepares tanker facilities for first shipment of crude from Kuwait. . . . The Anglo-Iranian refinery is scheduled to go on stream in February. . . . ¶Big Pemex lubricating-oil plant at Salamanca refinery is expected to go into full operation in near future. . . . ¶Survey shows 70 per cent of free-world refining capacity outside the United States is owned by American, British, and British-Dutch companies. . . . ¶Wildcat drilled in northern Spain by Spanish Government and American interests had only slight oil show at last report, but more exploratory work is planned. . . . ¶Spanish and American contractors team up to construct pipeline serving United States military bases in Spain. . . .

DRILLING—Better communications between contractors and operators needed, annual A.A.O.D.C. meeting told. . . . Contract disagreements over crooked-hole and free-time provisions would be minimized by a better working relationship, Southeastern Drilling's W. P. Clements tells contractors. . . . ¶Area-by-area study of drill-pipe and pipe-joint wear giving contractors a yardstick for estimating life of drill string is presented by A.A.O.D.C. subcommittee. . . . ¶J. V. Dunbar, Denver, named association president to succeed Karl L. Kellogg. . . .

INDUSTRY—Oil and natural-gas interests invited to submit written views on a national fuels policy to cabinet committee which will make recommendations to President by December 1. . . . Deadline for oil industry's offerings is October 20. . . . ¶Wallace E. Pratt, internationally known geologist, to receive the A.P.I. 1954 Gold Medal for Distinguished Achievement. . . . ¶Pure Oil named operator of proposed gasoline plant to halt flaring in Colorado's Adena field. . . . Unitization for repressuring may follow. . . .

Government Counts $129,000,000 as . . .

Offshore-Leasing Marks Tumble

WASHINGTON.— Record-shattering bids were offered for oil and gas leases on the outer Continental Shelf last week as oil companies set the pace for future offshore drilling.

Surprised Interior Department officials added up the score and found that the federal Government had been offered just short of $129,000,000 for 97 leases off Louisiana.

The top price offered by Forest Oil Corp. of San Antonio, Tex., nearly doubled the $3,068,000 paid Louisiana 10 months ago by Gulf Oil Corp. Four of the six top bids in last week's sale were well above this previous record and two of them were submitted by Gulf.

The bidding indicated operators are not only willing, but eager, to move farther from shore and into deeper water in their search for additional oil reserves. All six of the top bids were on tracts in water at least 40 ft. deep—two of them exceed 60 ft. All six are more than 30 miles south of the Louisiana shore line and one is more than 40 miles seaward.

The top bids of more than $5 million for 5,000-acre blocks were offered for tracts in the Ship Shoal and Eugene Island areas off Terrebonne and St. Mary parishes. Here are the record-breaking bids:

. . . **Forest Oil Corp.,** $1,220 an acre or a total of $6,100,000 for a 5,000-acre tract in the Ship Shoal area about 32 miles south of Terrebonne Parish.

. . . **Gulf Oil Corp.,** $1,201.40 an acre or a total of $6,007,000 for a 5,000-acre block in the same area that is located in 60 ft. of water. Gulf also bid $1,000.80 an acre or a total of $5,004,000 for the 5,000-acre block which adjoints Forest's record tract.

. . . **Sinclair Oil & Gas Co.,** heading a group composed of Standard Oil Co. (Ohio), Peoples Producing Co., El Paso Natural Gas Co., and Western Natural Gas Co., $1,103.80 an acre or $5,519,000 for 5,000 acres in the Ship Shoal area. This tract adjoins the block for which Gulf bid more than $6 millions and is in 60 ft. of water.

. . . **Union Producing Co.,** $1,100 an acre for the 2,500 acres in the west half of a Eugene Island block 35 miles south of St. Mary Parish in 40 ft. of water. The total bid was $2,750,000.

. . . **Phillips Oil Co.,** $1,053.20 on acre or a total of $5,266,000 for a 5,000-acre block in the Eugene Island area that is in 40 ft. of water about 45 miles south of St. Mary Parish.

The Government originally offered 199 tracts for leasing and Interior officials expected to get about $50,000,000 for the lot. Nineteen tracts were eliminated from the list shortly before the sale because they lie within the 3-league boundary claimed by Louisiana *(The Oil and Gas Journal, October 4, page 104).* Only 97 of the remaining 180 tracts were sought by the competing bidders.

Not all of them brought fancy prices. Humble Oil & Refining Co. was the only bidder on two tracts at $17.68 an acre. The lowest offers made were for $16.40 an acre—just $1.40 above the $15-an-acre minimum prescribed by law.

In contrast to the spirited bidding

Who Bought Where . . .

WEST CAMERON

Company—	Block No.*	Acreage	Bid	Price per acre
Superior Oil Co.	168	2,500	$128,125	$51.25
Atlantic Refining Co., Tide Water Associated Oil Co., Cities Production Corp., and Continental Oil Co. (joint bid)	248	5,000	2,256,000	451.00
Shell Oil Co.	249	5,000	1,100,000	220.00
Shell Oil Co.	252	5,000	2,600,000	520.00
Gulf Refining Co.	253	5,000	4,003,000	800.60
Atlantic Group	254	5,000	151,500	30.30

EAST CAMERON

Atlantic Group	60	2,500	903,000	121.20
Atlantic Group	61	2,500	253,500	141.40
Shell Oil Co.	82	2,500	1,300,000	520.00
Shell Oil Co.	82 (W½)	2,500	1,600,000	640.00
Gulf Refining Co.	103	5,000	501,500	100.30
Gulf Refining Co.	104	5,000	2,752,000	550.40
Gulf Refining Co.	105	5,000	601,500	120.30
Gulf Refining Co.	114	5,000	1,002,000	200.40
Gulf Refining Co.	115	5,000	2,003,000	400.60
Gulf Refining Co.	116	5,000	351,000	70.20

VERMILION

Atlantic Group	88	2,500	378,750	151.50
Shell Oil Co.	92	5,031	1,650,000	327.95
Atlantic Group	94	2,500	55,000	22.00
Atlantic Group	95	2,500	378,750	151.50
Shell Oil Co.	111	4,995	1,650,000	330.32
Atlantic Group	119	5,000	505,000	101.00
Atlantic Group	120	5,000	255,000	51.00
Atlantic Group	123	5,000	765,000	153.00
Atlantic Group	124	5,000	2,256,000	451.20
Gulf Refining Co.	163	5,000	401,000	80.20
Shell Oil Co.	164	5,000	2,062,000	412.40
Humble Oil & Refining Co.	165	5,000	88,400	17.68
California Co.	178	5,000	526,000	105.20
California Co.	179	5,000	526,000	105.29
Gulf Refining Co.	180	5,000	701,500	140.30
California Co.	184	5,000	175,250	35.05

EUGENE ISLAND

Union Producing Co.	53	5,000	550,000	110.00
Humble	62	5,000	88,400	17.68
Humble	63	5,000	88,400	17.68
Shell	64	5,000	103,000	20.60
Humble	76	5,000	264,000	52.80
Humble	77	5,000	513,000	102.60
Humble	84	5,000	88,400	17.68
Humble	85	5,000	88,400	17.68
Union Producing and Shell	116	2,500	1,500,000	600.00
Union Producing	116 (W½)	2,500	2,750,000	1,100.00
Placid Oil Co.	117	2,500	1,760,000	704.00
Texas Co.	118	2,500	530,700	212.28
Shell	128-A	1,573	1,217,000	773.52
Phillips Oil Co.	129-A	3,824	4,166,000	1,089.23
Standard Oil Co. (Ohio)	130	2,500	113,349	45.34
Kerr-McGee Oil Industries, Inc.	137	2,500	350,000	140.00
Magnolia Petroleum Co.	138	2,500	500,200	200.08

for oil and gas leases, only 5 of the 108 tracts offered for sulfur leases brought bids. The only company interested was Shell Oil Co. which offered from $16.50 to $130.20 an acre for the 25,000 acres.

Although the bidding was heated, with as many as 11 offers for some tracts, only one tie resulted. Union Producing and Shell made identical offers of $600 an acre for a 2,500-acre tract in the Eugene Island area. Considerably lower bids were offered by five other companies.

Interior officials said the tying bidders will be allowed 15 days to file an agreement accepting the lease jointly. If this is not done, all bids will be rejected and the lease re-offered.

Twenty-three oil companies, groups and individuals submitted bids, but the top bonuses were offered by 19 bidders. Gulf made the top offer on 23 tracts; a group composed of Tide Water Associated Oil Co., Cities Production Corp., and Continental Oil Co. was high on 13 tracts; and Shell and Humble were both high on 12.

Last week's bidding answered the question of just how highly the industry regards offshore prospects. It left at least two major questions:

... What's out there in the way of oil reserves?

... Who really controls the disputed area, the Government or Louisiana?

. . . And For How Much

Company—	Block No.*	Acreage	Bid	Price per acre
Continental Oil Co.	138 (W½)	2,500	101,000	40.40
Kerr-McGee	139	2,500	350,000	140.00
Sohio	139 (W½)	2,500	256,937	102.77
Kerr-McGee	150	2,500	500,000	200.00
Kerr-McGee	151	2,500	500,000	200.00
Kerr-McGee	152	2,500	2,666,000	1,066.40
Kerr-McGee	167	5,000	3,766,000	753.20
Humble	171	5,000	88,400	17.68
Phillips Oil Co.	172	5,000	3,666,000	733.30
Sinclair Oil & Gas Co., Peoples Production Co., Sohio, El Paso Natural Gas Co., Western Natural Gas Co. (joint bid)	175	5,000	2,519,000	503.80
Shell	176	5,000	1,352,000	270.40
Sohio	181	5,000	109,365	21.87
Phillips Oil Co.	184	5,000	3,666,000	733.20
Humble	185	5,000	139,000	27.80
Shell	188	5,000	3,308,000	661.60
Humble	189	5,000	2,155,000	431.00
Sinclair Group	190	5,000	4,053,000	810.60
Phillips Oil Co.	191	5,000	5,266,000	1,053.20
Stanolind Oil & Gas	191	5,000	166,650	33.33
Roy Lee, Dallas	198	5,000	86,000	17.20
Roy Lee	199	5,000	510,000	102.00
Placid Oil Co.	202	5,000	85,500	17.10
Placid Oil Co.	210	5,000	1,300,000	260.00
Roy Lee	211	5,000	525,000	105.00
SHIP SHOAL				
Gulf Oil Corp.	128	5,000	501,500	100.30
Gulf Oil Corp.	148	5,000	801,500	160.30
Forest Oil Corp.	149	5,000	6,100,000	1,220.00
Gulf Refining Co.	150	5,000	5,004,000	1,000.80
Sinclair Group	153	5,000	5,519,000	1,103.80
Gulf Refining Co.	154	5,000	6,007,000	1,201.40
Kerr-McGee	155	5,000	2,166,000	433.20
Shell Oil Co.	171	5,000	550,000	110.00
Atlantic Group	172	5,000	101,000	20.20
Gulf Refining Co.	173	5,000	3,003,000	600.60
Atlantic Group	174	5,000	101,000	20.20
SOUTH TIMBALIER				
Humble Oil & Refining Co.	54	2,500	759,000	303.60
Humble Oil & Refining Co.	55	2,500	759,000	303.60
Kerr-McGee	107	5,000	200,000	40.00
Kerr-McGee	128	5,000	4,166,000	833.20
Gulf Refining Co.	129	5,000	431,000	86.20
Gulf Refining Co.	130	5,000	1,002,000	200.40
Gulf Refining Co.	131	2,148	501,500	233.42
Gulf Refining Co.	132	2,148	501,500	233.42
Gulf Refining Co.	133	5,000	1,002,000	200.40
Gulf Refining Co.	134	5,000	431,000	86.20
Gulf Refining Co.	135	5,000	2,602,000	520.40
Gulf Refining Co.	151	5,000	1,702,000	340.40
Gulf Refining Co.	152	5,000	431,000	86.20

*Block numbers are those which appear on official leasing maps of the Bureau of Land Management, Department of Interior.

The answer to that first question may be several years in coming. Exploration of the outer shelf will be a gradual and slow process, limited in pace by a shortage of equipment to do the job in deep water.

What's here . . . Geological guesses at what the shelf holds vary widely. Geophysical surveys reveal many favorable oil structures, but stratigraphically the geologist is shooting in the dark. The next few years will be devoted to casting a little light on that darkness and not on producing oil for an immediate market.

Operators are shooting for big stakes and they are betting high, but their purpose is establishing reserves rather than immediate production. The risk involved in the game has already been demonstrated. Gulf got its feet wet early when it paid $3 million for a block 8½ miles off Mustang Island. Early this month Gulf abandoned its first wildcat on the block after drilling to 12,500 ft. from a platform in 67 ft. of water. *(The Oil and Gas Journal, October 4, page 105.)*

Ownership tangle . . . It is pretty generally conceded that the courts will have to ravel the tangled question of ownership of the lands off Louisiana. The state claims ownership of the lands by virtue of its "historic" boundary which was revitalized by an act of the Legislature. This quietly enacted bit of legislation extends Louisiana's control over the shelf as far as 35 miles seaward in some places.

Federal authorities contend the Government has control over everything farther than 3 miles from Louisiana's shore. A seven-man committee composed of Interior Department men and Louisiana state officials have worked on an agreement to settle the dispute, but nearly everyone concerned agrees final settlement will be up to the courts.

Texas sale . . . This legal tangle will not be involved next month when the Government receives bids on 38 tracts totaling 111,789 acres off the coast of Texas. These tracts lie outside the 3-league or 10½-mile limit. In addition, Texas has maintained a 2-mile "buffer" zone between its lands and those under Government control to avoid any conflict.

Lands off Texas are less highly regarded than those of Louisiana. Few tests have been made and Texas is generally believed to have less prominent potential reservoir sands than Louisiana. Texas prospects are in deeper water than most tracts off Louisiana.

Journal survey indicates . . .

. . . There's Less Gas Being Sold

- **Most majors are steering clear of new gas contracts until the air clears some over the extent of FPC control**
- **It isn't unanimous, however; some companies find they are forced to commit some reserves, despite their wishes**

GAS producers, by and large, are not making new sales of gas to interstate pipelines if they can avoid it.

Most of them hope that within a few months the confusion arising from the Supreme Court decision in the Phillips Petroleum Co. case will be cleared up. In the meantime many of them are dragging their feet on new sales contracts.

So far this situation has not put a pinch on any transmission company. What worries the pipelines is whether or not producers will be permitted to exercise the escape clauses in existing contracts and cut off present supplies.

But it is a routine and continuing operation for most gas companies to keep picking up small supplies of new gas even though they are not expanding their lines or markets. As new wells are brought in along their gathering lines they normally contract to purchase the gas. This offsets the depletion of their major supplies and maintains the total of their dedicated reserves.

"Since the Phillips decision," one pipeline official said, "our supply department hasn't turned a wheel. Nobody wants to sell us any gas. Normally we would have made a couple of dozen small purchase contracts in that length of time, but we haven't been able to sign up a single foot of gas."

Why There's Less Gas

Reluctance to make new contracts is due, of course, to the Federal Power Commission's Order 174-A, which requires producers to apply for a certificate for every sale of natural gas to an interstate transmission company. Issuance of a certificate makes the producer a "natural gas company" under federal law and subjects him to FPC regulation of his rates and other operations.

Producers who were selling gas to interstate lines on June 7, the date of the Phillips decision, are required to file for certificates by December 1. Practically all of them probably will do so, though under protest and with the hope that an act of Congress or another court decision will soon relieve them of this necessity.

Even so, many of these same producers want to avoid further entanglement with FPC on new sales. It costs something to file an application and to comply with all the legal red tape. And there is always the possibility that the Phillips decision will not be set aside and that all interstate sales will be regulated permanently.

Some have no choice . . . Very often a producer has no alternative to making a new contract with an interstate line. His lease and offset obligations may prevent him from keeping his wells shut in, and there may be no intrastate market available.

Such is the fix of an independent producer in Texas who recently brought in three small gas wells. He was negotiating a sale to an interstate transmission company when the Phillips decision came along. Since he had no other interstate sales which would place him under FPC jurisdiction, he dropped the negotiations when the pipeline told him he would have to file for a certificate.

But he is in trouble. If he doesn't start producing and selling his gas soon he may forfeit his lease and lose his investment in the wells. He is satisfied with the price offered, but he is afraid that FPC may reduce the price later, keep him from making a reasonable profit, and involve him in expensive and bothersome red tape over what is really a small volume of gas and a sideline to his oil operations.

Size helps . . . Big companies, too, are often in the same predicament. But they have the financial resources to wait until the atmosphere clears, and many are doing so wherever their lease terms permit.

One of the large gas producers in the Southwest has a definite policy of holding back on new gas sales wherever possible. This company has three newly developed gas fields which it can keep shut in for the present, and it also is delaying the drilling of new wells in prospective gas areas.

"We have no intention of putting any more gas into interstate pipelines than we are committed to do by present contracts until such time as we can see that we can do so with a suitable profit now and in the future," an official said.

This is a fairly general attitude. A spot survey by the Journal staff among the larger producing and transmission companies in the Southwest clearly indicates that producers have, to say the least, lost their eagerness to develop new gas reserves for interstate transmission.

Typical Situation

Here is a situation which may be typical: A group of independent producers controls a large gas reserve. Part of it is already dedicated to an interstate line at a price considerably lower than more recent contracts the same company has made in the same general area.

Shortly before the Phillips decision, the producers were negotiating for an increase in price which the company was willing to pay provided the producers would undertake to increase the reserves.

The new contract called for the producers to dedicate three deeper gas sands in this multizone field, two of which were definitely known to contain large reserves of gas but none of which had been included in the original dedication of the shallower zones. They were also to undertake an extensive drilling program, construct more gathering lines, and increase the surface area under dedication.

The producers would have had to spend at least a million dollars to fulfill the new contract, but they expected to be repaid for this by the higher price for the gas delivered under the original dedication even if relatively small additional reserves were developed by the new program.

But the negotiations were dropped cold when the Phillips decision was handed down. The producers decided to let their undeveloped gas stay in the ground until such time as they can be sure that the Federal Power Commission will not attempt to lower the sales price of their gas or interfere with the terms of their contract.

In this instance the termination of negotiations relieved the pipeline com-

pany of its promise to increase the price of gas being delivered under its old contract. But it also deprived it of a potentially large new reserve. The company doesn't particularly need the new reserve this year, but was willing to pay the asked price in order to have the new reserve for the future.

Faith in FPC . . . Not all producers feel the same way. One fair-sized oil company operating throughout the Southwest is going ahead with drilling and production in gas areas as though nothing had happened. It is seeking the best deals possible for its gas, whether the buyer is an interstate pipeline or not.

This company is banking on the belief that FPC will play fair with producers and will not reduce their contract prices nor subject them to unnecessary regulation or red tape. It feels that in order to assure interstate lines of adequate gas supplies the FPC will have to approve prices set by arms-length bargaining, including escalation provisions.

Opposite Views

The divided attitude of producers—and the general reluctance to discuss the matter for publication—is illustrated by the replies of two major oil companies in Tulsa. Officials of both talked freely about their policies but insisted that their companies not be identified.

One of these has filed 18 applications with FPC for new interstate sales since Order 174-A was issued, but every one of these was considered "unavoidable." Sale to an interstate line had to be made to avoid flaring and waste of gas, because partners in a joint operation favored a sale, or because of some other obligation.

But aside from that, this company, a big gas producer, has made no effort to negotiate new contracts with interstate lines and intends to adhere to the policy of holding back its gas wherever possible until the situation is clarified.

An entirely opposite policy is being followed by the other, and equally large, Tulsa company. It takes this position: "We are in the business of producing and selling oil and gas, and we are continuing in this business in spite of FPC. We are complying with all requirements, and if FPC attempts to set aside the terms of any of our sales contracts we will deal with the situation as seems best at that time."

So far only one really large gas dedication has come to public notice since the Phillips decision. It is a sale by a group of producers of 60 million cubic feet a day in Wise County, Texas, to Natural Gas Pipe Line Co. of America *(The Oil and Gas Journal, October 4, page 119).*

Pipeline Replies

Several transmission companies queried by the Journal replied simply that they have had no occasion to negotiate new purchase contracts since the FPC issued Order 174-A.

One replied: "Although I have heard that this order has in effect frozen a great deal of gas from interstate markets, we cannot from our own experience verify this."

Another said: "Experience indicates that generally the large producers are making no new contracts while the small ones are proceeding as usual. In cases where financial or lease conditions will permit nonproduction, most producers are not making new sales. Development appears to be unchecked."

One big transmisison company said: "Some producers are likely to slack off on future development of their gas reserves for resale purposes because they already have more gas to get rid of than they possibly can. The price freeze hasn't helped any.

"Operators don't seem to be too concerned over the actual price freeze. It isn't the price per M.c.f. so much as it is the fear of getting involved in federal red tape with FPC."

Said another: "The fear of federal regulation, plus the uncertainty of the situation, is seriously affecting our chances of signing up new gas supplies.

"However, we feel that, since FPC has extended the deadline for some of the provisions of Order 174-A until December 1, the picture may be clarified by that time."

Intrastate sales up . . . An interesting commentary came from a company which to a considerable extent acts as a wholesaler of natural gas in the Southwest, selling to carbon-black plants, intrastate distributors, and interstate transmission lines. The company wrote:

"We find independent producers more eager than ever to sell us gas for intrastate consumption, even at considerable sacrifice in price. On the other hand, negotiations for the sale of gas to interstate pipelines have bogged down due to uncertainties."

A somewhat similar situation is reflected by Lone Star Gas Co., Dallas, which operates both intrastate and interstate systems. It has had no occasion to make large purchases since the Phillips decision, but has negotiated many small contracts. It has encountered no instances where producers have refused to sell, but in many cases the producers have demanded assurance that the gas will not go into interstate commerce.

General complaints . . . Two gripes are common in every oil center in the Southwest. One is that nobody knows how to comply with all the FPC requirements. Another is that the paper work is greatly increasing companies' work load and overhead costs.

One small operator said his bill for photostats alone came to $1,800. Another was so concerned over duplicating costs he went out and bought his own photostat outfit.

Phillips chairman predicts . . .

. . . Gas Supplies Will Diminish

NEW YORK.—A positive prediction that the supplies of gas for interstate transmission will diminish under federal regulation was made to the American Gas Association last week by K. S. Adams, chairman, Phillips Petroleum Co. He said:

"Those who championed the cause of regulation are about to learn that they have won a battle only to lose a war. In a speech at Kansas City in 1951 I warned that federal regulation of natural gas was 'the sugar-coated route to less natural gas at higher prices.'

"That prediction is now borne out. Already the operating burdens and economic uncertainties thrust upon producers by federal regulation have served to reduce the interstate gas supply. The Supreme Court's decision of last June has resulted in the abandonment, curtailment, or suspension of at least three major gas-transmission projects.

"Curtailment of pipeline projects is dramatic proof that the consumers' gas supply will be gradually reduced under federal regulation. It means that many thousands of homes will not have any natural gas, and that many more will be denied the additional gas they would like to have."

Better Relations Needed

Drilling contractors told to be less mysterious about costs, promote tool pusher-drilling foreman relations

K. B. Barnes

LOS ANGELES.—The drilling contractors, themselves, have contributed to the low contract prices in the Mid-Continent, Gulf Coast, and West Texas areas by a lack of communication with the operator.

A good relationship between the operator's drilling foreman and the tool pusher would eliminate a lot of problems before they arise, the annual meeting of the American Association of Oilwell Drilling Contractors was told here last week by W. P. Clements, Jr., of Southeastern Drilling Co., Dallas.

Too often, Clements said, the contractor has approached this problem of communication on the basis of "free tickets to the O. U.-Texas football game, a case of whiskey at Christmas time, a fishing trip in the spring, a hunting trip in the fall, or some other method of subsidizing the company man." This, he said, immediately circumvents the development of a good, sound, working line of communication.

With a good relationship, he said, changes in the mud program, disagreement over the blowout-preventer manifold, waiting time, hole deviation, and similar problems could be worked out on the foreman-tool pusher level.

Contractors appear to have been too mysterious with the operator over cost information, Clements suggested.

"Unfortunately, in some cases the contractor was formerly making too much money, and now the pendulum has swung in the opposite direction and a good many contractors are not earning sufficient profit margin to allow continued existence.

"If some of these contractors had been on a good, sound, reasonable basis, with free exchange of cost data to their operator client," Clements continued, "perhaps in some areas the present situation would not be so acute.

"There is nothing mysterous about cash cost and most company, or operator representatives, at the management level are very sympathetic to factual cost data."

Contract problems . . . Two contract-provision problems invariably come up in discussions with company representatives. They are:

. . . Crooked-hole provisions. "All production departments contacted," Clements said, "agreed that the present hole-deviation provisions in most drilling contracts work a hardship on the contractor, but invariably they did not feel that this relative position should be materially changed."

. . . Free-time "misnomer." "All the companies contacted agreed that there is no such thing as free time and most of them have now stopped asking for time allowance for running logs, etc.

"Along this same line, the companies have considerably shortened their WOC (waiting on cement) time from 48 hours to 24 hours or less on the surface casing and from 72 hours to 36 hours or less on the oil strings. Going even beyond this, some companies have completely eliminated WOC time on the oil string, with all work done after the plug bumps bottom being on a chargeable day-work basis."

Profit is down . . . In his presidential address, Karl L. Kellogg, Long Beach drilling contractor, criticized those associated with the oil industry who "do not recognize the importance of the drilling industry and are not willing to give it a like position within the overall industry as to other entities."

He referred to an Oil and Gas Journal news story in which part of the headline used the phrase, "The honeymoon is over" *(August 23, page 92)*, and said: "I would like to ask when the contractors ever had a 'honeymoon.'"

"In spite of the sly remarks about contractors driving around in Cadillacs," Kellogg said, "the average net profit, after taxes, on the Pacific Coast last year was 3.42 per cent, and this is a so-called boom year for drilling."

Resolutions . . . Directors of the association adopted a resolution objecting to the U. S. Supreme Court decision in the Phillips Petroleum Co. case.

The association went on record as petitioning Congress to amend the Natural Gas Act so as to make it clear that the Federal Power Commission shall not have authority to fix the price of gas as required by the Supreme Court decision.

Contractors told how to . . .

Figure Drill-Pipe Wear

D. H. Stormont

LOS ANGELES. — Drilling contractors last week were given a yardstick to help them determine when to rejoint their drill pipe, rehardface their tool joints or pipe, or retire their drill pipe.

Life of drill pipe and tool joints varies widely from area to area, John Rhea, of Southeastern Drilling Co., told the annual meeting here of the American Association of Oilwell Drilling Contractors.

Reporting on a survey made by a rotary-drilling subcommittee, Rhea said the decisions "involving whether or not to rehardface, rejoint, or retire the string of pipe should be answered with consideration of the economics for the individual contractor operating in his specific area."

While information gathered by Rhea's subcommittee was of a general nature, he outlined these average wear conditions for various regions:

. . . Gulf Coast: "Upon 9⅞-in. holes ranging in depths from 10,000 to 14,000 ft., either 4½-in. o.d. or 5-in. o.d. drill pipe will drill an average of 300,000 to 350,000 ft. of hole.

Nonhardfaced standard outside diameter tool joints will only last for approximately 100,000 ft. of hole, and therefore most of the tool joints bought for use in this area are hardfaced in the shop at the time of purchase. . . .

"No resleeving of tool joints is done in this area, and the reports are that tong-die expense upon hardfaced joints is approximately three times as great as that upon nonhardfaced."

. . . California: "Upon wells of an average depth of 8,000 ft., 4½-in. drill pipe will last for 200,000 ft. of hole, but the normal life of standard outside diameter hardfaced tool joints is only 100,000 to 175,000 ft. of hole. Therefore the general practice is to rehardface the tool joints at least once, and from this improvement, an increase in

TWO MEN INSTRUMENTAL in making plans for the annual A.A.O.D.C. convention at Los Angeles last week seem pleased at the way the proceedings were going. E. C. Brown, of Brown Drilling Co. of Long Beach (left) is chatting with J. M. Grant, Los Angeles, vice president of Loffland Bros., during a lull in the schedule. Brown served on the executive committee, and Grant was head of both the registration and program committees.

the life of the tool joints of 40,000 to 60,000 ft. of hole will be had. . . ."

. . . Kansas: "For usage in drilling Kansas wells averaging in depth from 3,200 to 3,500 ft., both the drill pipe and standard outside diameter nonhardfaced tool joints have a service life of approximately 150,000 ft. of hole. The very little hardfacing of tool joints done in this area is usually for the purpose of restoring the outside diameter of used joints."

. . . Illinois: "Formations encountered in Illinois are probably the most abrasive in the United States with the possible exception of the Delaware basin. Average life of drill pipe is about 90,000 ft. whereas the average life of oversized hardfaced tool joints is only about 45,000 ft. Therefore the general procedure is to rejoint the pipe at least once and in many cases it is rejointed twice."

. . . Oklahoma: "In southern Oklahoma the average life of 4½-in. drill pipe varies from 100,000 to 125,000 ft. of hole. . . . Generally speaking, an oversize 6-in. o.d. hardfaced tool joint is installed on new pipe, and to wear out the pipe and the tool joint, two or three reapplications of the tungsten carbide are required. . . .

"In northern Oklahoma the formations are not as abrasive and show about the same wear characteristics as those found in Kansas. . . ."

. . . Permian basin: "Relative lack of abrasion in drilling the lime, shale, and dolomite formations tend to make the tool joints last longer than the drill pipe, but the life of the drill pipe is erratic due to corrosion fatigue," Rhea declared.

Natural-Gas Stock Soars

NEW YORK. — Value of common stock in natural-gas and gas-transmission companies has risen sharply during the past year.

A recent survey by the American Gas Association shows the composite price of common stock in 30 natural-gas companies rose 25.2 per cent during the year. The price of 10 gas-transmission company stocks rose 25.4 per cent.

Dividend payments, while increasing, lagged considerably behind the price spiral. Dividends from the natural-gas companies surveyed rose 6.1 per cent, compared to an increase of 7.1 per cent in returns from transmission companies. Because of the wide spread between price and dividend, the natural-gas stocks experienced a decline of 15.3 per cent in yields as compared with a drop of 14.6 per cent in yields of stock in transmission companies.

STOCK PRICES, DIVIDENDS, AND YIELDS†

	Sept. 24,	Sept. 25,	1954-1953	
	1954	1953	High	Low
30 natural-gas common stocks:*				
Price (dollars per share)	33.04	26.40	33.15	25.67
Dividend (dollars per share)	1.57	1.48	1.57	1.41
Yield (per cent)	4.75	5.61	5.66	4.74
10 gas-transmission common stocks:				
Price (dollars per share)	38.90	31.01	38.90	30.59
Dividend (dollars per share)	1.80	1.68	1.80	1.63
Yield (per cent)	4.63	5.42	5.49	4.48

*Includes 20 gas-transmission and distribution stocks included above, plus stocks of 10 integrated companies. †A.G.A. figures.

Drillers Elect

Dunbar succeeds Kellogg as president of A.A.O.D.C.

LOS ANGELES.—J. V. Dunbar, owner of Dunbar Drilling Co., Denver, was elected president of American Association of Oilwell Drilling Contractors at the group's 14th annual meeting here last week.

Dunbar, who was named "outstanding oil man of the year" by Colorado Governor Dan Thornton at the association's meeting in Denver in 1953, succeeds Karl L. Kellogg, K. L. Kellogg & Sons. Dunbar had previously served the organization as vice president at large, and chairman of the membership committee. He started his oil career as a roustabout and worked in many fields before founding his own contracting business in 1929.

J. V. DUNBAR

Eleven vice presidents were also named. They are: C. F. Whaley, Chet Whaley Well Servicing Co., Houston; H. W. Davidson, Davidson Drilling Co., Midland, Tex.; W. S. Fitzpatrick, Fitzpatrick Drilling Co., Corpus Christi, Tex.; Herbert A. Woolf, Woolf & Magee, Tyler, Tex.; Gail C. Culter, Culter Drilling Co., Tulsa; John J. Moran, Moran Bros., Wichita Falls; Dee A. Sikes, Helmerich & Payne, Tulsa; Robert L. Rose, Drilling & Exploration Co., Los Angeles; Alva C. Davis, Fairfield, Ill.; R. L. Manning, R. L. Manning Co., Denver; and J. K. Butler, Oil Production Maintenance, Houston.

Other officers named are: L. A. Beecherl, McDaniel & Beecherl, Dallas, treasurer; W. L. McClusky, M. J. Delaney Co., Dallas, secretary; Brad Mills, Dallas, executive vice president; and Marion S. Church, Dallas, general counsel.

TRANSCONTINENTAL'S "SUPER-INCH" pipe is laid in sections at stream crossing, but the "sewer-pipe" system of laying each joint separately is followed elsewhere.

Many obstacles overcome as . . .

. . . Transco Lays 36-in. Line

HOUSTON.—Use of 36-in. pipe by Transcontinental Gas Pipe Line Corp. in the $6,533,000 looping program on its Texas-New York line is a pioneering step in big-scale transmission of natural gas. Like most pioneers, the contractors are facing—and solving—some major problems in laying the line.

The first 14.4-mile section of the super-inch line has been put in service, and most of the remaining 34.52 miles is due for completion by November 1. Contractors estimate the final 4.15-mile section will be finished in mid-November.

Transco's use of 36-in. pipe in looping its 30-in. main line may be a turning point in pipeline construction. The project marks the first use of 36-in. pipe as part of a proposed ultimate looping program, and with the exception of about 10 miles previously laid elsewhere, it is the first use of the pipe in gas transmission.

Super-inch pipe was decided on because it was considered most satisfactory for the company's ultimate looping program. Initial work on the line is in the Tylertown, Miss., and Selma, Ala., areas.

Construction obstacles . . . The contractors, Associated Pipe Line Contractors, Inc., have been largely "feeling their way" in laying the king-size line.

In calling for bids, Transco left the pipe-laying methods to the discretion of contractors. Associated decided on a "sewer-pipe" method, wherein individual joint of pipe is lowered into the trench and welded in place. The conventional, "over-the-trench" method is being used, however, in stream crossings where it is considered desirable to lower the pipe in multiple-joint sections.

The sewer-pipe technique was decided on because of:

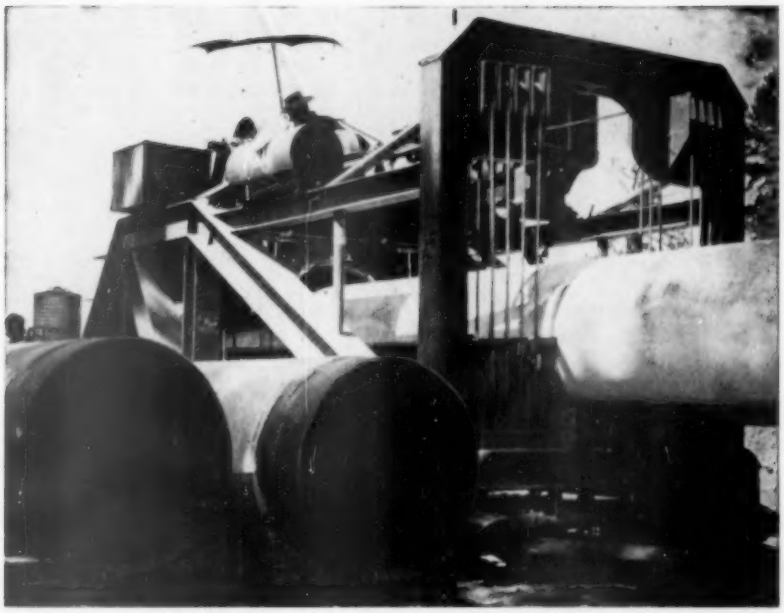
. . . **Weight of pipe.** With the 36-in. pipe weighing about 154 lb. per linear foot, much heavier equipment would have to be used in handling a section of this pipe than a section of 30-in. pipe.

. . . **Equipment costs.** Equipment was readily available to handle individual joints of 36-in. pipe. It would have been necessary to tie up a great deal of money in specialized equipment to handle long sections.

. . . **Size of the spread.** The entire spread is able to work closely together, within a distance of about ½ mile. Once a joint is welded, that part of the line is finished and there is no waiting for a lowering and tie-in crew behind the spread. Consequently, manpower requirements are considerably reduced.

WELDERS put finishing touches on pipeline coupling in bellhole, where trench is deep and wide to permit room to work.

Although many of the obstacles were foreseen, other problems arose once pipe-laying operations were under way. Some have been solved, some are still



BENDING MACHINE at work on Transcontinental's looping project shapes the 40-ft., 36-in. pipe to fit the terrain. Once a joint is bent to fit, it is placed in the trench and welded to the preceding joint.

giving trouble, and others probably will arise.

Yard coating . . . Joints are coated and wrapped in yards located at Tylertown and Selma. Due to the amount of handling involved after the pipe leaves the yard, coating includes enameling, a glass-fiber wrap, an asbestos-felt wrap, a paper wrap, and a final white-washing.

Pipe bending . . . Bending is done after the pipe is wrapped. Although the 36-in. joints are readily bent, special care is used in grading of the ditch to eliminate the number and severity of bends. Since the supply of 36-in. pipe is limited, extra precautions are taken to prevent damage to the joints, which could result in costly shutdowns. Some modifications were made in the bending machines, normally used with bare pipe, to prevent damage to the coating.

Ditch digging . . . Lining up individual joints requires an oversize ditch. While a 52-in. width probably would have sufficed in the open-trench method, a 66-in. width was considered more practical for the sewer-pipe method. The contractor is still experimenting to determine the best means of digging the ditch for such an operation.

On most of the job, no ditching machine was used. Instead, the contractor relied mostly on draglines and backhoes. However, in some places the contractor used a ditching machine to dig a pilot ditch, then finished with a backhoe.

Bellholes . . . Welding, of necessity, is done in bellholes, and this poses a variety of problems.

Since cutting of the pipe might upset the bellhole pattern down the line, bellhole crews must not operate too far ahead of the pipe crew. Another problem is encountered in marshes and swamplands, where bellholes are not practical. Heavy rainfall, too, is a threat, since it would require installation of pumps to drain water from the bellholes.

Industry Briefs

COLUMBUS, Ohio.—Ohio Fuel Gas Co. will begin construction soon on 46 miles of pipeline and 3,000 additional hp. on its natural-gas transmisison system in Ohio. The line, to be built in Jackson, Vinton, Hocking, and Fairfield counties, will enable Ohio to receive more gas from its affiliate, United Gas Fuel Co., of Charleston, W. Va. The line and the additional horsepower will cost $3,832,700.

MARCUS HOOK, Pa.—Sun Oil Co. started operations this week on a new catalytic hydrogenation process designed to upgrade lubricating oils. The new unit is located at the company's refinery here. It utilizes high purity hydrogen produced by a 15,540-bbl. per day Houdriforming unit.

HOUSTON.—Stockholders of Tennessee Gas Transmission Co. and its affiliate, Tennessee Production Co., have voted their approval of a proposal to merge the production company with the transmission company. Gardiner Symonds, president of the transmission company, said a joint application for approval of the merger was filed immediately with Federal Power Commission.

EDMONTON. — Gibson Crude Oil Purchasing Co. will build a pipeline and crude gathering system in Rimbey D3 producing area about 70 miles southwest of Edmonton. The $75,000 project will include 2½ miles of 4-in. transmission line and about the same amount of 3-in. gathering lines.

NEW YORK.—The annual report of the American Gas Association forecasting gas supplies and requirements through 1957 is now available from the A.G.A. The report can be obtained from the A.G.A. Bureau of Statistics at $2 a copy. A summary of the forecast appeared in The Oil and Gas Journal, October 4, page 108.

HOUSTON. — Triangle Refineries, Inc., Houston, has purchased Coastal Petroleum Corp., Mobile, Ala., a firm which operates products terminals on Blakely Island, Mobile, and in Niceville, Fla. The terminals have a capacity of 13,600,000 gal. Triangle Refineries is headed by J. B. Sanders. John T. Cochrane, president of Coastal Petroleum, will continue as operations manager of the firm.

CHARLESTON, W. Va. — H. C. Price Co. of Bartlesville, Okla., has completed laying a 57-mile, 30-in. natural-gas pipeline for United Gas Fuel Co. of Charleston. The line extends from the Big Sandy River near Catlettsburg, Ky., eastward to near Charleston.

SANTA FE, N. M.—New Mexico will hold a sale here October 19 of oil and gas leases on 55 tracts of public lands. E. S. Walker, commissioner of public lands, said last week sealed bids will be taken on 42 of the blocks. The remainder of the acreage will be sold in oral bidding.

QUINCY, Mass.—The S.S. Socony-Vacuum, 228,000-bbl. tanker launched here October 1, will be used primarily between Beaumont, Tex., and Socony-Vacuum Oil Co., Inc., installations along the East Coast. The 604-ft. ship, latest addition to the deep-sea fleet operated by Socony-Vacuum, replaces a tanker by the same name which was taken out of service recently.

WALLACE PRATT . . . Geologist, author, and philosopher.

Pratt to Get Award

Noted geologist named winner of A.P.I. medal

NEW YORK.—Wallace E. Pratt, internationally known geologist, will receive the American Petroleum Institute's 1954 Gold Medal for Distinguished Achievement.

The award is regarded as one of the nation's top industrial citations. It is presented to some outstanding American, not necessarily an oil man, who has made substantial contributions to the arts and sciences of the petroleum industry, or to humanity through the petroleum industry.

Pratt, a former vice president and director of Standard Oil Co. (N. J.), now lives near Carlsbad, N. M.

The award will be presented November 10 during the A.P.I.'s thirty-fourth annual meeting in Chicago by P. C. Spencer, chairman of the board of the A.P.I. and president of Sinclair Oil Corp.

Previous recipients of the medal include Otto D. Donnell, former president of Ohio Oil Co.; Lt. Gen. Ernest O. Thompson, chairman of the Texas Railroad Commission; Walter C. Teagle, former president of Standard Oil Co. (N. J.); J. Howard Pew, former president of Sun Oil Co.; Dr. Charles F. Kettering, scientist and inventor; Dr. William Burton, former vice president of Standard Oil Co. (Ind.); and Henry Ford, the motor magnate.

Previous honors . . . For Pratt the A.P.I. award will be the most recent of many high honors. A past president of the American Association of Petroleum Geologists, he was the first recipient of that group's Sidney Powers Medal in 1945. In 1948 he received the Anthony F. Lucas Medal of the American Institute of Mining and Metallurgical Engineers. He has prepared more than 100 papers on geological subjects and is author of the book, "Oil in the Earth."

Pratt entered the oil business in the Philippines for the island government and returned to this country in 1916. He joined Humble Oil & Refining Co. in 1918 and rose steadily through the ranks.

In 1937 he became a Jersey Standard director and 7 years later was elected a vice president.

Although he retired from active business life in 1945 at the age of 60, his activities as a scientist, prospector, and author have continued unabated.

Processing Plant Planned

HOUSTON.—Humble Oil & Refining Co. plans to build a field processing plant on the Cherokee County side of Neches oil field, East Texas. A site has been purchased.

The plant will be the termination point of a field gas-gathering system being constructed by Brown & Root, Inc. The system will go into service around the first of November.

Neches field has two producing sands, the Woodbine and sub-Clarksville. They are yielding oil at the rate of more than 1,000,000 bbl. a year. Completion of 100 wells in the field is expected by the end of the year.

Buckeye Line Begun

NEW YORK.—Buckeye Pipe Line Co. has begun construction on an 80-mile, 8-in. products line between Lima and Columbus, Ohio.

Sheehan Pipe Line Construction Co. of Tulsa has the contract for the job and expects to have the line completed by the end of 1954.

The line is an extension of Buckeye's existing midwest products system running from Lawrenceville and Robinson, Ill., to Toledo, with intermediate terminals at Indianapolis, Muncie, Ind., and Lima.

Microwave Users Reorganize

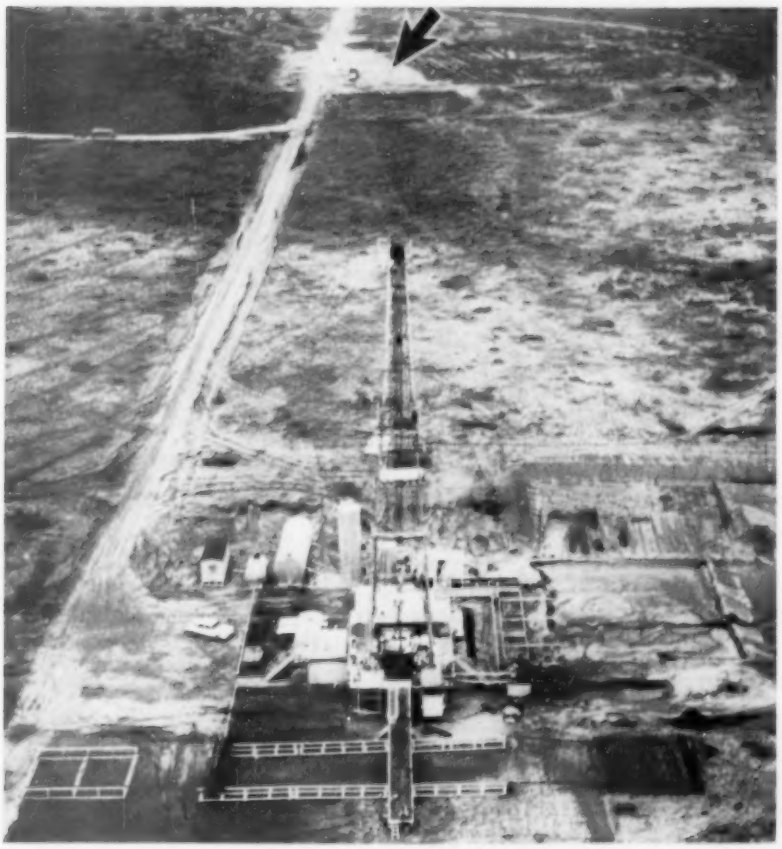
HOUSTON.—Microwave users in the petroleum industry, along with representatives from the aviation, forestry, railroad, trucking, and power industries, have reorganized the old Microwave Users Council under the name Operational Fixed Microwave Council.

Primary aims of the new council will be to assist in developing a set of microwave operating rules, promote allocation of suitable frequencies for its member industries, and aid in establishing technical standards for equipment.

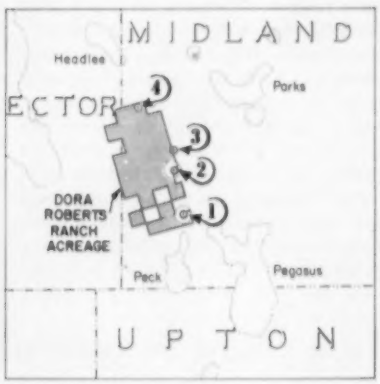
The council will also assemble data on microwave systems and keep a library of maps showing terminal and repeater locations, beam orientation, operating frequencies, and related data.

The council also will act as a clearing house for license applications for new construction. It will have a quasi-official status in that the Federal Communications Commission will require a council recommendation before granting licenses for proposed microwave installations.

OPERATIONAL FIXED Microwave Council, a voluntary organization consisting of representatives of organizations which use microwave systems, has elected its officers who will serve for 2 years. Officers for the 1954-56 period are (left to right) Clifton D. Campbell, Humble Pipe Line Co., representing the American Petroleum Institute, chairman; L. E. Ludekens, Southern California Edison Co., representing National Committee for Utilities Radio, vice chairman; and L. E. Kearney, representing Association of American Railroads, secretary.



BRITISH-AMERICAN'S 1 Roy Parks, Jr., completed as a 740-bbl. Ellenburger producer through small choke, extended Headlee field 3 miles southeast and set off a new drilling play. This National 125 jackknife rig is drilling Southland Royalty Co. 1 Parks as an east offset to the completed discovery (arrow at top of picture). Exploration Drilling Co. is contractor. Tide Water and U. S. Smelting also have moved in for offset tests.



West Texas Still Hot

Drilling continues at rapid pace in Ector and Midland following series of major discoveries in recent months

Carl Hoot

ODESSA.—West Texas' current hot spot of exploration drilling, a 15-mile-long and table-flat stretch of land starting about 5 miles northeast of here, has witnessed a succession of Ellenburger discoveries in recent months. Last week a fourth new pool in the chain was opened.

This area extends from Headlee field in eastern Ector County, southeast through the Roberts Ranch fields (Virey and Warsan), to Sweetie Peck and Pegasus in southwestern Midland County. Last week's completion is a possible link between the ranch fields and Headlee.

The new discovery is Forest and Cities Service 1 Dora Roberts B-1 (No. 4 on the accompanying map). This well is more than 3 miles northwest of the nearest completed well in the Roberts ranch area and the same distance southeast of British-American Oil Producing Co.'s recent Ellenburger extension of Headlee field. British-American's well was a major southeast extension and carried Headlee's producing limits into Midland County.

No. 1 Dora Roberts B-1 is structurally higher on the Ellenburger than any other well in the 15-mile trend, being 172 ft. higher than the highest well in Virey pool, 5 miles to the southeast, and 148 ft. higher than the highest well in Headlee field to the northwest. These figures are based on a corrected Ellenburger top of 12,835 ft., or minus 9,982 ft. in 1 Roberts B-1. Operators perforated a 177-ft. section at 12,835-13,012 ft. and completed the well for a daily potential of 1,417 bbl. of oil, based on a 6-hour flow of slightly more than 354 bbl. through 1-in. choke. Gas-oil ratio was 1,195:1 and flowing tubing pressure was 250 psi.

Recent discoveries . . . Growth of the new fields along this trend is shown by the map, on which Ellenburger discoveries are numbered from 1 to 4. A previous Ellenburger discovery immediately south of the Roberts ranch has since been assigned to Peck and Pegasus fields by the Texas Railroad Commission.

First of the discoveries was Forest and Cities Service 1 Roberts C-4, which had the Ellenburger at minus 10,171 ft. Potential was 3,205 bbl. daily through 1-in. choke.

Second was Warren Petroleum Corp. 1 Wallin. This well was 225 ft. low on the Ellenburger correlated with the C-4, at minus 10,396 ft., but flowed 671 bbl. daily on completion through 48/64-in. choke. Development around this well is Virey field. Production is found in both Pennsylvanian and Ellenburger formations.

Third is Forest and Cities Service 1 Parks, located on the outside of Roberts ranch and about midway up its eastern boundary. Potential here was 3,320 bbl. daily through 1-in. opening, and minus datum point on the Ellenburger was 10,140 ft.

No. 4 on the map is 1 Roberts B-1, with its minus datum point of 9,982 ft. Should the series of Ellenburger strikes prove to be on one structure, this well has a possible 500-ft. Ellenburger sec-

tion above the mean water table on the various fields.

Other tests . . . Current tests at Forest and Cities Service 2-C-4 Roberts, northeast offset to the discovery of Warsan field (No. 1 on the map), suggests a series of producing highs along the trend. This well ran approximately 167 ft. lower on the Ellenburger than the Warsan discovery, and drill-stem tests in the formation have had little more than gas shows. Field reports indicated it may be plugged back.

Companies affected by the deep discoveries, other than Forest and Cities Service, include Phillips Petroleum Co., Sinclair Oil & Gas Co., Warren Petroleum Corp., Magnolia Petroleum Co., Vickers Exploration Co., Texas-Gulf Producing Co., and British-American Oil Producing Co.

Current drilling activity in the area includes five rigs running for Forest and Cities Service; two wildcats going for Warren, and five development wells drilling. Six rigs were running in the Headlee area, including three at new offsets to British-American's southeast extension.

Here's how to control . . .

. . . Corrosion In Pipelines

Robert G. Deering

DALLAS.—What's the best method for control of internal pipeline corrosion? This question got a double-barreled answer at a meeting here of the South Central Region of the National Association of Corrosion Engineers.

For corrosion control in products pipelines, P. L. Deverter of Humble Oil & Refining Co., said his company has found oil soluble inhibitors to be more effective and more economical than the water-soluble type. Deverter said the inhibitor caused a noticeable increase in the C factor of pipelines and a corresponding decrease in the number of scraper runs necessary.

Earlier use of water-soluble types did not afford the desired degree of protection, he said, and was accompanied with high costs in scraping and filtering operations. Also, with the old type, protection stopped at the pipeline terminus, where the oil-soluble material stays with the product—protecting storage tanks, tank trucks, filling stations, etc.—until the product is consumed.

As to costs, he said that while outlay for the oil-soluble type is considerably more than for the other, an over-all saving is brought about by the need for only one injection point, the lower costs of scraping and filtering, the fact that no water is added to the line, the higher pumping rate with a cleaner line, and the great advantage of having protection extended beyond the pipeline terminus.

Crude-line protection . . . Prevention of corrosion in sour crude gathering lines in West Texas is being effectively and economically done by internal plastic coating, J. C. Watts, also of Humble Pipe Line, said at the meeting.

Watts said internal plastic coating of lines in place will show a payout within 2 to 5 years, depending on line length and previous costs of maintaining the uncoated lines.

Generally, on lines up to 5 miles in length, plastic coating will be the most economical method of corrosion mitigation, he said. However, other methods should be considered on longer lines.

Although many improvements have been made recently in methods of coating, one of the major problems remaining is in drying of the applied coating, he said. When insufficient drying air is supplied, or drying time is not long enough, the solvents from the coating will condense and cause "washing" of the paint film.

Watts said that better results are obtained when coatings are dried by aspirating air into the pipe at reduced pressure rather than blowing warm compressed air through it. Not as much atmospheric moisture is induced into the line and the reduced pressure allows solvents to leave the coating more easily.

Ammonia success . . . Ammonia injection may be the best answer to control of internal casing corrosion occurring in the vapor space of flowing wells, Howard E. Greenwell, Atlantic Refining Co., said.

Gaseous ammonia, injected directly into the casing-tubing annulus, dissolves in the condensed water on the casing walls and raises the solution pH above the corrosive range, he said. It also combines with acid gases, such as hydrogen sulfide and carbon dioxide, to form a still more alkaline solution.

In recent tests, Greenwell said several wells in the Wasson field were treated with 15 to 30 lb. of ammonia each. The casings were later blown down, the blowdown gas analyzed, and the depth penetration calculated from the distribution of free ammonia and ammonia compounds. The results definitely establish that protective quantities of ammonia will diffuse downward to a depth below the zone of most corrosion.

The depth of penetration is proportional to the amount of ammonia used, he said, but cautioned against using large doses at one time since plugging might occur from the ammonia acid reaction. Several small injections should eventually saturate the well, giving complete protection.

Greenwell said that on the basis of these tests, his company is starting an injection program on all unpacked flowing wells susceptible to casing vapor space corrosion. Twenty-five pounds of ammonia will be used every 3 months and the cost is estimated to be around $100 per well per year.

Amines Save Money

Corrosion engineers hear results of Stanolind tests

DALLAS.—Money-saving results are being obtained with a new series of amine inhibitors in combating many oil-industry corrosion problems, Loyd W. Jones, Standard Oil & Gas Co., said at the N.A.C.E. meeting here.

The new series of inhibitors have undergone extensive laboratory and field tests, and are being used in about 1,000 of Stanolind's corrosive wells, both sour and sweet.

As an example of the amines' effectiveness, Jones said that one field in West Texas had 20 rod failures in the 8 months prior to introduction of the inhibitor and had only one in the 11 months afterwards. Repair expenses on one group of wells in East Texas averaged $850 per month before using the amines and $8 month for 13 months after their use.

A wet gas line in North Louisiana was protected by lubricating the oil-soluble type directly into the line. In this case the corrosion rate, as measured from coupons placed into the line, declined 88.5 per cent.

The oil-soluble compounds consist of long, straight-chain aliphatic amines and an acid component of organic acids and oxygenated hydrocarbons. Jones said that greatest success had been with amines containing 10 or more carbon atoms in the chain. There is a decided break between decyl amine, (C_{10}), and

octyl amine, (C_8), with the latter being much less effective.

Jones said the compounds can be made water soluble by the addition of emulsifiers and solvents, and, where well treatment with liquids is not practical, the inhibitors can be formed into sticks or pellets.

Pollution Control

Legislative plans drafted by water advisory council

AUSTIN.—The Texas Water Pollution Advisory Council has made 13 recommendations for new legislation—five of them directly affecting the petroleum industry.

The recommendations, contained in the council's annual report, were turned over to the Water Resources Committee for possible additional suggestions to the legislature.

Recommended pollution-control measures affecting oil provide that:

. . . **A state agency** be given adequate authority, personnel, and funds to assure proper control and disposal of oil-field brines.

. . . **The Texas Railroad Commission** be given regulatory authority over exploratory operations (including the drilling of shot and core holes) to assure protection of surface and underground fresh waters from pollution.

. . . **Industrial-waste disposal** be controlled to prevent pollution of surface and underground waters.

. . . **Research** be conducted by the state to find more economical methods of treating industrial wastes and to develop processes for treating wastes so complex that no feasible, economic method has yet been discovered.

. . . **Industrial plants** be required to submit plans for waste-treatment facilities to the state. The state should determine whether the facilities would produce an effluent which could comply with existing anti-stream pollution statutes.

Cycling Due Change

Pipeline asks voice in any future action in La Gloria

AUSTIN.—Portions of the gas cycling operation in La Gloria field have reached economic limits and the program needs to be revised, Magnolia Petroleum Co. and the La Gloria Oil & Gas Co. told the Texas Railroad Commission last week.

Cycling operations have been conducted in the multiplay field in Jim Wells and La Gloria counties since May 1941. Gas has been reinjected into almost a dozen formations of the 35 gas-producing zones found in the Frio and Vicksburg transition zone from 5,100 to 8,000 ft.

W. H. Speaker, representing Magnolia, told the commission studies completed this year indicate cycling should be terminated in the Stolze, Culpepper, Brooks, and North Bauman zones. He recommended operations be continued in the Hornsby "A", Conkle, and South Bauman zones and cycling be started in the Hornsby "C" and Arguellez reservoirs.

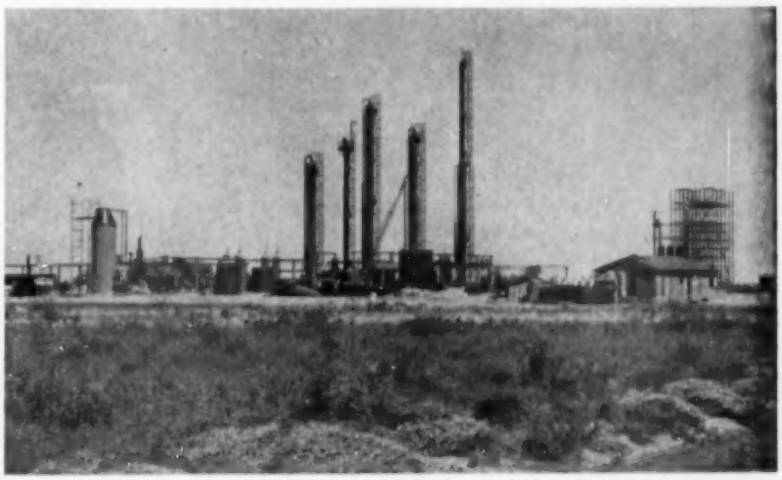
If the cycling program is continued and extended where feasible, Speaker estimated ultimate recovery of liquids will be increased by 5,600,000 bbl.

Pipeline concerned . . . Representatives of Texas Illinois Natural Gas Pipe Line Co. asked that the proceedings be reopened after Texas Illinois has had time to study the data and exhibits and to prepare its case.

The company argued that Magnolia and others had failed to show what effect proposed changes in the program would have on deliveries of gas from the field to the Texas Illinois system.

The company charged that cycling has reduced its take from the field to 35,000,000 cu. ft. daily compared with a volume of 85,000,000 cu. ft. daily called for under its purchase contract.

Texas Illinois said it had had to replace this lost gas with supplies obtained under short-term contracts at about twice the price. The company said it also wants time to cross-examine Magnolia witnesses when the hearing is reopened.



HEADLEE FIELD GAS will be taken soon by this $1,750,000 natural-gasoline plant under construction by Texas Gulf Producing Co. 4 miles north of Odessa (Photo by Midland Reporter-Telegram).

Headlee Plant Near Completion

ODESSA, Tex.—Texas Gulf Producing Co. estimates construction will be completed before the end of the year on its new Headlee field natural-gasoline plant 4 miles north of here in Ector County.

The $1,750,000 plant is located in the north end of the field in the NW¼ of Section 8, T&P RR Co. Survey, Block 41, T-2-S.

Design gas-processing capacity of the plant, being built by O. L. Olsen & Co., Houston, is 15,000,000 cu. ft. daily, with provision for expansion to 35,000,000 cu. ft. daily.

Texas Gulf Producing expects continued development of the Ellenburger and Devonian reservoirs in the rapidly growing field to bring gas production up to the present maximum feed rate by March or April of next year. Plant production at this rate will be about 1,400 bbl. daily of unfractionated liquids and 12,500,000 cu. ft. per day of residue gas. The unfractionated product will be sold by pipeline to Phillips Petroleum Co. The residue gas will be sold to El Paso Natural Gas Co.

Design and engineering of the plant was done by C. F. Braun & Co., Alhambra, Calif. Facilities include gas-treating equipment to remove sulfur and water vapor, L.P.G.-natural gasoline absorption units, compressors to boost field gas to sales pressure, a gas-gathering system, and complete utility systems and facilities for operation and maintenance.

Gulf Fishing In Deep Hole

ODESSA, Tex.—Gulf Oil Corp. encountered more trouble last week at its I P. G. Northrup, record deep test 24 miles southeast of Pecos in Reeves County, West Texas.

Operator was attempting to fish out packers which stuck during a drill-stem test run with hole bottomed at 18,609 ft. A Gulf official said that no results were obtained in the test.

At last report one of three packers had been recovered, and the operator was fishing for the second. An overshot fishing tool was being used.

This is the second fishing job at the well in the past few weeks. Between the two, little hole was made due to lost circulation.

GULF COAST

Cradle Hikes Barge Depth Limit

ORANGE, Tex.—If your submersible drilling barge isn't big enough to drill in the water depth you want—just "drydock" it in a submersible cradle that will increase its depth range up to 35 ft.

That's the theory behind an offshore drilling barge "support" designed and built here by Levingston Shipbuilding Co. for Penrod Drilling Co. of Shreveport. The new "cradle" will be used in Penrod's Gulf of Mexico operations.

The unit is 220 ft. long, 72 ft. wide, and 40 ft. deep. It is an all-steel, welded structure that will support the average drilling barge and will sink to the ocean floor supporting the barge above it. Piling driven into the ocean floor alongside the submerged unit give it added stability.

Once the drilling barge is in the unit's "slot," the two become an integrated unit and can be towed to a well location. The cradle unit is equipped with two pumps on each wing wall to expel ballast water and allow the unit to rise to the surface once drilling is completed.

Two 10-ton derricks, complete with air hoists, have been installed on the wing walls to load heavy supplies onto the drilling barge itself.

Shell to Use New Platform

HOUSTON.—Shell Oil Co. will use a new floating platform in exploring a block lying under 50 ft. of water off San Luis Pass, 10 miles northeast of Freeport, Tex.

The $4,000,000 drilling platform, now being outfitted for G. C. Glasscock Drilling Co. at Bethlehem Shipyards in Beaumont, is designed for drilling in 20 to 100 ft. of water. The unit will be operated by Glasscock under a contract with Shell.

The platform is scheduled to be towed into the gulf about November 1.

The unit is said to combine the mobility of a drill barge with the stability of a fixed platform. It consists of a drilling platform, service platform, and 72-ft. portable bridge which will connect the two.

Wildcat Spudded

Stanotex starts offshore test, completes pipeline

HOUSTON. — Standard Oil Co. of Texas has started a new wildcat in Gulf of Mexico off Kleberg County, South Texas, the third well to be drilled by the company in the tidelands this year.

The new test, No. 23 in Tract 948, will go to 8,800 ft. and is in the "Quail area," 30 miles southwest of Port Aransas. It will be the third well drilled from Stanotex's six-well platform which stands in 35 ft. of water 1½ miles offshore.

Pipeline completed . . . The first commercial oil production from the Texas tidelands began flowing last week when Stanotex completed a submarine pipeline running from its platform to the shore of Kleberg County.

The crude is being moved to the Corpus Christi refining area. Stanotex has two wells completed on the platform in addition to the recently spudded wildcat.

Standard of Texas is the only company which has found commercial oil production in the Texas tidelands. Its first well, drilled off Padre Island 1½ miles from shore, was completed several months ago, flowing more than 200 bbl. per day *(The Oil and Gas Journal, July 5, page 102)*.

Texas Boundary Unsettled

WASHINGTON.—The Department of Justice has not yet recognized Texas' claim to a 3-league boundary in the Gulf of Mexico.

Although a number of administration officials from President Eisenhower down have expressed the belief that the state's claim should be recognized, Attorney General Herbert Brownell, Jr., said at a recent news conference that there are legal questions involved to which the answers have not yet been determined.

The 1953 legislation relinquishing federal claim to the disputed tidelands did not specifically lay down the boundaries of the coastal states but said merely that their "traditional" boundaries were to be recognized. Validity of the Texas claim was questioned again after Louisiana laid claim to a 10½-mile limit this year. The border issue also was raised in the Texas gubernatorial campaign.

Brownell indicated that settlement of the question may be sought through a lawsuit against the two states.

Grady Second Most Active

Southwestern Oklahoma area has 70 rigs in operation making it nation's No. 2 county in drilling activity

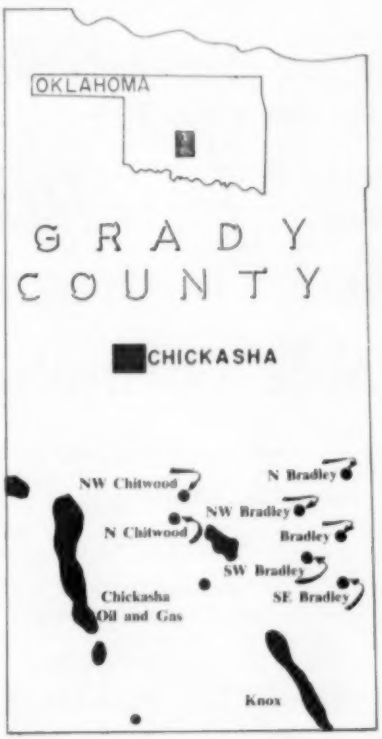
John C. McCaslin

CHICKASHA, Okla.—Grady County, in southwestern Oklahoma, is the second most active drilling area in the nation.

Grady currently has 70 active operations, outclassed only by big 75-rig Andrews County in West Texas. Each week of the year has seen an increase in exploratory and development work. Centers of all this activity are the Chickasha gas field area and the Bradley pools. High success ratios, leasing, and geophysical work have given impetus to the current drilling spree.

The active rigs are at six wildcat locations and 64 field tests. The Chickasha field leads with 39 rigs, followed by the Bradley area with 27, the Chitwood area with three, and the Knox area with one.

A show of gas was reported last week at one of the wildcats, Mack Oil Co. 1 Shellnut, northwest of Chickasha. In a drill-stem test at 9,075-9,130 ft., the well recovered 280 ft. of fresh water and 120 ft. of gas-cut mud.



Chickasha field . . . In this area of the county the development of the Noble Olson (Permian) oil pay zones has highlighted western Grady's drilling pace.

The Chickasha oil pay was opened last April at General Drilling Co. 1-A Farrwell. The discovery well flowed 174 bbl. of oil per day to open the fast-developing new production. The development work is being done in the zones above 3,500 ft. Noble Olson production has been extended south into 6-3n-7w with success also reported in 36-4n-8w.

This fast play is being carried on largely by independents, frequently on principal-company farmouts. Among the most successful operators here are General Drilling Co., Rowland Drilling Co., Little Nick Oil Co., Atmar, B. B. Burke, Woodward, and others. Also participating are Magnolia, Anderson-Prichard, and Oklahoma Natural Gas Co. There is an increasing number of holes going on down below the Noble Olson series, with 10,000-ft. tests expected soon.

Bradley pools . . . Pennsylvanian and Ordovician exploration and development highlights southeastern Grady County's drilling activity.

Production from a huge Springer (Pennsylvanian) reservoir is steadily being extended in the Bradley pools area, ranging from 2n-3w in Garvin County northwestward to 5n-5w, Grady County. The wildcatters are out to define the possible limits of the Springer zone trap. This exploratory race has taken rigs into 5n-5w. A recent dry hole in 16-5n-5w has drawn productive limits of the trend in the township's western portion. The developed Springer reservoir at present is about 12 miles northwest-southeast and 3 miles east-west.

More fuel has been added to the Grady fire with recent prolific Ordovician production in the eastern part of 5n-5w. One of these Ordovician discoveries, Phillips Petroleum Co. 1 Steve in Bradley field, established Oklahoma's deepest oil production at 13,804 ft. in the Oil Creek sand. The well is a northeast extension and new-pay discovery for the area. It flowed 114 bbl. of oil per day from the first and second Bromide sands at 12,603-806 ft.; 166 bbl. from the third Bromide, McLish, and Oil Creek sands at 12,885-13,804 ft.

Another significant strike for the area is newly-completed Gulf Oil Corp. 1 Costello, a prolific wildcat discovery 2½ miles north of the 1 Steve. The Costello well was completed flowing 1,872 bbl. of oil per day and 4,200 M.c.f. of gas from Bromide sands at 11,747-11,890 ft.

Unitization Sought

Water flood is proposed for Oklahoma City field

OKLAHOMA CITY.—The Corporation Commission has been asked to approve unitization plans for the first water-flood project ever attempted in the 25-year-old Oklahoma City field.

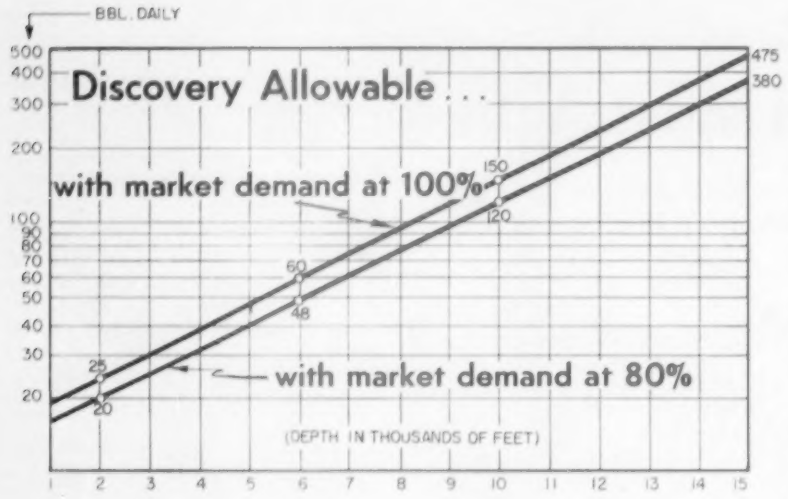
Cities Service Oil Co. has asked the commission to approve unitization of seven leases covering 429 acres in the heart of the field. Cities Service estimates a water flood of the Middle Hoover sand zone at an average depth of 4,025 ft. will result in the recovery of an additional 1,250,000 bbl. of oil from the sand. The zone averages 16 ft. in thickness and has a porosity of 20 per cent.

Cities Service has secured approval of 95 per cent of the working interests in the tract under consideration and more than 70 per cent of the royalty interests. There are now eight producing wells on the seven leases. If the commission approves the plans, three will be converted to water injection, 13 more injection wells will be drilled and eight new producing wells sunk.

Products System Expanded

KANSAS CITY, Mo.—Great Lakes Pipe Line Co. has completed construction of the 717 miles of new products lines in its current expansion program.

The extensions include 353 miles of 12-in. lines and 364 miles of 8-in. lines. The new lines parallel existing systems except from Rosemount to Willmar, Minn.; from Nebraska City to Doniphan, Neb., and from Iowa City, Iowa, to a junction with the Badger line near Rochelle, Ill. New and expanded pumping stations are expected to be completed within a few weeks.



Hole depth is a factor in . . .

New Allowable Formula

Paul Swain

OKLAHOMA CITY. — The Oklahoma Corporation Commission has placed an allowable premium on deep wildcatting.

A new discovery allowable, based on depth, has been adopted by the commission.

The commission tossed out the old, blanket 60-day, 150-bbl. daily allowable for all discoveries. It substituted the new formula which allows a discovery well to produce oil in direct relationship to its depth.

The new formula is included in proposed revisions of the general rules and regulations which are expected to be presented to the commission by an industry committee some time in the next few weeks *(The Oil and Gas Journal, June 28, page 81)*. It was adopted at the request of Massena Murray, Oklahoma's new conservation director, who said it is too important to await complete revision of the rules.

The formula contains only two variables. They are:

. . . Depth in thousands of feet to the nearest 200-ft. interval. This factor is determined by measurement from the top of the hole to the center of the producing formation.

. . . Market demand to be determined by the commission each month.

How it works . . . With a good demand for crude the commission would set a market demand factor of 100 per cent. A well drilled to 2,000 ft. would be assigned a discovery allowable of 25 bbl. daily; a 6,000-ft. well would have a 60-bbl. daily allowable; a 10,000-ft. well a 150-bbl. allowable; and a 15,000-ft. well an allowable of 475-bbl. daily.

Here's the Formula

$$Y = DCE^{mx}$$

Y = daily allowable per well.
D = market demand percentage factor.
C = 15.036 (base market demand constant).
E = 2.7182818 (base of Naperian logs).
M = 0.23026 (depth-cost-ratio exponent).
X = depth in thousands of feet to the nearest 200 ft.

At the time the commission adopted the new formula, however, demand for crude was soft. It set the market demand factor at 80 per cent. This shaves the allowable for the 2,000-ft. well to 20 bbl. daily; the 6,000-ft. well to 48 bbl. daily; the 10,000-ft. well to 120 bbl. daily, and the 15,000-ft. well to 380 bbl. daily.

The premium on deeper drilling is apparent in that a well must be at least 10,000 ft. deep in order to obtain the old discovery allowable of 150 bbl. daily—with the market demand factor at 100.

Murray points out that the commission can vary the demand factor at will to compensate for variations in demand.

What's behind it . . . The discovery allowable is based on the same theory involved in the proposed regulations for all allowables. The recommendation to be made for general allowables contains an acreage spacing factor.

The new discovery allowable is expected to relieve the commission of one of its current headaches. In setting statewide allowables each month, commission estimates of production have nearly always fallen far short of actual production. This production over the estimate can be attributed in a very large part to the 150-bbl. daily allowed every discovery well in the state. Much of this drilling has been in shallow areas and in rapidly drilled and completed wells.

The new formula was worked out by a subcommittee of the general industry committee on changes in the general rules. It represents an engineering study of depth costs on about 1,000 Oklahoma wells.

Presumably, the commission will publish a simplified table setting out the allowable figures based on depths in 200-ft. intervals. Otherwise, you'll have to dig out your slide rule and logarithm tables and go to work on the rather formidable looking formula.

Discovery Indicated

Test might become first Johnston County producer

TISHOMINGO, Okla.—Johnston County may become Oklahoma's sixty-seventh oil-producing county.

Glen Hoffman has an indicated discovery in this southern Oklahoma county at the 1 Bilbrey, NW NE SW 1-2s-8e, 2¼ miles northeast of Wapanucka near the Coal and Atoka county lines.

The well topped an unidentified lime

at 1,115 ft., and oil and gas began showing near the top of the lime. No drill-stem test was run, but the wildcat showed signs of kicking out. A heavier drilling mud reportedly was necessary to prevent a blow-out.

Nearest production to the shallow, remote wildcat is in the Clarita District, 6 miles north. The potential discovery is slated to go to 1,500 ft. It is in the geologically complex southwestern section of the huge McAlester basin.

contractor, was awarded the contract.

In 2-7n-56e, Shell 2 Eagle Springs unit was drilling below 8,400 ft. This is a step-out of the discovery well.

Ferndale Refinery Tested

SEATTLE.—Test runs have started at General Petroleum Corp.'s new refinery at Ferndale, Wash.

The $35,000,000 project has a crude capacity of 35,000 bbl. daily. It is connected with a spur line from Trans Mountain Oil Pipe Line Co.'s new crude system extending from Alberta to Vancouver, B. C. *(The Oil and Gas Journal, August 9, page 67.)*

Geologists to Meet

LOS ANGELES. — A symposium covering techniques of offshore petroleum exploration will be held at the thirty-first annual meeting of the Pacific Section, American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists.

More than 1,000 geologists and geophysicists are expected to attend the meeting, which will be held here November 11-12.

WEST COAST

Gas Demand Growing

Rising population in California may force finding of additional out-of-state gas supplies before 1960

LOS ANGELES.—Additional out-of-state gas probably will be needed before 1960 when California's population is expected to reach 14,000,000, members of the California Natural Gasoline Association were told at their annual meeting here.

Under extreme winter conditions, F. M. Foster of Southern California Gas Co. stated, there would be a firm gas requirement of more than 1.5 billion cu. ft. daily. State gas sources, including underground storage, can provide only about 1 billion cu. ft. If it were not for the Texas and New Mexico gas being brought into the state there might be a deficiency of more than 500,000 M.c.f. daily.

Firm requirements on a typical day last summer totaled only 316 million cu. ft. for a fluctuation of more than 500 per cent from the peak winter requirements, Foster said.

"However," he added, "our rate of supply is relatively constant, varying little between summer and winter. As a matter of fact, the contract for out-of-state gas carries a 'take or pay' provision based on a 91 per cent annual load factor."

About the future . . . California's anticipated population of 14,000,000 by 1960 would be an increase of 15 per cent over the 1954 population. Foster predicted Southern California will get "its share" of new residents.

Foster pointed out that multimillion-dollar pipelines to transport gas from out-of-state must be utilized at or near capacity in order to pay off. He suggested underground storage and interruptible service to industry as possible means to close the gap between supply and demand.

"In our experience to date, underground storage has been costly. With large capital investments required and high operating costs, it appears completely impractical at this time to develop storage capacity to fully equate differences between supply and firm demands."

Nevada Wildcat Planned

ELKO, Nev. — Bandini Petroleum Corp., Los Angeles, late last week moved in a rig for a 7,000-ft. wildcat 7 miles north of Shell Oil Co.'s Nye County oil discovery.

Located in NW NE 25-10n-57e, 1 Harris-Government will be a joint operation with Moriqui Exploration Co. The companies hold 3,600 acres in the area. F. E. Gover, Long Beach drilling

California Tops Area Spending

LOS ANGELES. — Post-war expansion of the petroleum industry in California has boosted investments by almost $2 billion since 1945 and accounts for about 40 per cent of the industry's total investment in the state.

A survey released last week by Charles S. Jones, president of Western Oil and Gas Association, lists the capital investment of the petroleum industry in the five states covered by the association at $5,325,700,000 as of January 1. Of that total, $4,964,200,000 was invested in California.

Post-war petroleum investments in the five states totaled an estimated $2,158,700,000, of which $1,964,200,000 was spent in California.

The association's survey also shows the petroleum industry had 152,200 persons on the pay roll in the five states at the first of the year, and it lists their total pay for the preceding year at $732,051,000. California led with 122,100 employes, followed by Washington with 14,600, Oregon with 9,400, Arizona with 4,700, and Nevada with 1,400. In addition, the five states had 38,785 wholesale and retail dealers, the survey shows.

The industry's total tax bill in the five states for 1953 was listed at $642,826,000.

Jones, who is president of Richfield Oil Corp., released the report to emphasize the economic importance of the petroleum industry in conjunction with Oil Progress Week.

PETROLEUM EXPENDITURES IN THE WEST*

(Thousands of Dollars)

	California	Arizona	Nevada	Oregon	Washington	Total
Original cost of physical assets, 1-1-54	$4,964,200	$42,800	$15,300	$110,200	$193,200	$5,325,700
Salaries and wages, 1953	601,591	19,508	5,983	41,298	63,761	732,051
State and local taxes, 1953	277,467	15,322	5,407	33,215	52,080	383,491
Federal taxes, 1953						259,335
Total, 1953						642,826

*Western Oil and Gas Association.

Oil's Comments Asked

Fuels policy committee invites written views of industry before presenting recommendations to Eisenhower

WASHINGTON. — Oil, natural-gas, and coal interests have been invited to submit written views on a national fuels policy to the Cabinet Committee on Energy Supplies and Resources Policy.

With only 6 weeks remaining before the December 1 deadline on which it must submit a report to President Eisenhower, the committee has set October 20 as the latest date for submission of recommendations.

Six consultants from the oil and gas industries were added to the committee's task force last week. Named to work on oil matters were Richard G. Gettell, chief foreign economist for The Texas Co., New York; Richard J. Gonzales, treasurer of the Humble Oil & Refining Co., Houston; Minor S. Jameson, Jr., assistant to the president of the Independent Petroleum Association of America, Washington, and Serge B. Juernev, assistant to the chairman of the board of the Continental Oil Co., New York. C. Pratt Rather, president of the Southern Natural Gas Co., Birmingham, Ala., former head of the gas division of the Petroleum Administration for Defense, will serve on natural gas matters, as will B. A. Hardy, Shreveport independent, who will head the group.

The actual work on the study is being conducted by a task force on which J. Ed Warren, former head of the Petroleum Administration for Defense, is responsible for oil and natural gas.

The invitation to submit briefs is expected to bring a large volume of views and recommendations. Officials of the I.P.A.A., the Independent Refiners Association of America and a number of other oil organizations, state regulatory bodies and individual operators have indicated they will submit material.

A number of statements already have been filed by the industries involved in the study and the Government agencies concerned with them.

Extending the general invitation to file, Mobilization Director Arthur S. Flemming, chairman of the committee, outlined the broad aims of the administration.

"Objectives of the committee," Flemming said, "are to make recommendations which would lead to strengthening the national defense, providing orderly industrial growth and assuring supplies of energy resources and fuel for our expanding national economy and any future emergency."

FTC Affirms Policy

Informal settlement offer turned down by commission

WASHINGTON.—If the Federal Trade Commission has charged you with suppressing or restraining competition by conspiracy or monopolistic practices, you can't make an informal settlement of your case.

The commission last week reaffirmed its bar to such settlements when one of its hearing examiners refused to negotiate an informal agreement to settle a case with U. S. Steel Corp. and four other steel drum manufacturers.

The companies took the position that "frank discussions" might show there is no justification for commission charges. They contended an agreement to voluntarily limit or discontinue the practices under attack would save time and expense.

The FTC complains that for many years the five companies have acted under an agreement to fix uniform base prices, price differentials, and terms and conditions for the sale and distribution of their steel drums.

In turning down the steel companies negotiation offer, the FTC said cooperative procedures for settlement of cases "should never be permitted as an easy escape for willful violators of the laws administered by the commission or for avoiding or delaying the effectiveness of its corrective action."

Refining Research Surveyed

WASHINGTON.—More than 75 petroleum refining companies are being asked by the National Science Foundation to provide information on their research and development activities as part of a nation-wide survey.

The survey will provide estimates on a nation-wide basis of the money spent for the conduct of research by size of company and by industry groups, the source of these funds by major economic sectors, and the amount spent by companies to finance research conducted elsewhere, as in universities and research institutes. The information also will permit the comparison of research expenditures to capital expenditures, sales and other relevant measures.

On the basis of the information sougth from some 12,000 industrial concerns a historical analysis of selected companies will be made in an attempt to reconstruct the gross pattern of industrial research over the past two or three decades.

Air Force Tests Pipeline Plan

WASHINGTON.—The Air Force is studying the possibility of delivering oil products to its bases by pipeline.

A test contract has been signed with Phillips Petroleum Co. to deliver jet fuel to the Smokey Hill Air Base in Kansas. The fuel is transported in Phillips' system from Borger, Tex., to Kaneb Pipe Line Co.'s line and then into the base.

Other companies supplying the Air Force with products have expressed interest in the test, and the Air Force is expected to give more companies permission to extend their lines into bases.

Gas Case Confronts Court

WASHINGTON.—Justices of the Supreme Court have returned to Washington for their 1954-55 term, facing an issue of vital importance to the oil and gas industry.

The big question is what the court will do about reconsidering its opinion in the Phillips Petroleum Co. case which places the sales of independent natural-gas producers under Federal Power Commission regulation.

Two Added By OGD

WASHINGTON.—William M. McEldowney, of Pittsburgh, and Alexander R. Rehrig, of Bartlesville, Okla., have been added to the staff of the Oil and Gas Division of the Department of the Interior.

McEldowney, who was associated with Gulf Oil Corp. for 29 years prior to 1952, will serve as a petroleum transportation and storage expert. Rehrig, an employe of Phillips Petroleum Co. in the refining department from 1941 until his appointment, will be refining technologist for OGD.

WATCHING WASHINGTON

Bertram F. Linz

ODM Planning Hampered

Stabilization planning for the next war has been slowed down by lack of funds for the Office of Defense Mobilization.

Appropriation cuts made by Congress this year have limited ODM's activities sharply, leaving little more than the facilities expansion program and other currently required work. Chances of getting increased funds are dampened by the unrelenting opposition in important quarters to advance planning for a war that may never come.

Aim of the ODM is to write legislation dealing with price, wage, materials and other controls to be put on ice until an emergency makes it necessary to send it to Congress. But there are many, in the Government as well as outside, who believe price controls aren't the best way of dealing with consumer goods distribution. As a result of experience in World War II and the Korean war, there is considerable belief that the best method is rationing, without the severe strain on the economy which price controls develop.

Rubber Sale Obstacles

Two recent developments may threaten the success of the Government's plan to sell its synthetic rubber facilities.

One was the recent death of Rep. Paul Shafer of Michigan, acknowledged expert in rubber matters to whom House and Senate members looked for advice. The other is the admitted growth of Democratic strength which may take control of Congress out of the hands of the Republicans.

Shafer, who entered Congress in 1937, played a leading role in the writing and enactment of the legislation which put the Government into the synthetic rubber industry after the outbreak of World War II, kept it in the business after the war and finally paved the way for disposal of the facilities this year. No other member of Congress has as deep a knowledge of rubber as he had. Without him disposal may have rough going.

If the Democrats gain control of Congress, or either house, there will be another cry of "giveaway" that will be hard for the Republicans to combat. The sales plan may well fail unless buyers come up with really good prices for the plants.

Although the Rubber Disposal Commission isn't talking, it is pretty well known that offers for the plants, although above their book value, are still well below the unrecovered cost to the Government.

If the plants are sold it is to the interest of the buyers that the greatest possible number of plants be disposed of. Otherwise, new owners of plants may face a substantial volume of productive capacity in the hands of the Government, ready to come into operation at any time the Government deems additional output is necessary.

Everyone Looks at Oil

The Cabinet Committee study of national fuel policy, involving oil imports and natural-gas competition with coal, isn't the only administration investigation which may have effect on the oil industry.

Another Cabinet committee and a number of federal agencies are studying transportation policy, with emphasis upon truck competition with the railroads. The oil industry uses many thousands of trucks and will be affected by whatever action comes out of the investigation.

The coal industry's fight against residual fuel oil and natural gas is for the market. The railroads' fight against the trucks is also for the market.

The railroads charge that the trucks don't pay their fair share of the cost of building and maintaining the highways they use. Truck owners contend they pay more than their fair share and currently are fighting a spreading "third tax".

The first tax, the truck operators say, is the registration and license fees they pay in every state in which they operate. The second is the state levy on the gasoline they consume. The third tax, which several states already have or are considering, is based on ton-mile, weight-distance and axle-mile charges. If adopted all over the country these would raise the oil industry's transportation bill by up to $10,000,000 a year.

The transportation study covers all aspects of freight and passenger movement.

ROCKY MOUNTAIN

Adena Unit Planned

Gasoline plant authorized; unitization is considered

FORT MORGAN, Colo.—Flaring of gas in Colorado's relatively new Adena field will be virtually halted under a recent agreement by operators calling for construction of a central gasoline plant and possible unitization of the field for pressure maintenance.

Pure Oil Co. has been named operator and authorized to accept bids for construction of a jointly owned $3,000,000 gasoline plant and gathering system. Most of the approximately 30 operators in the field also have expressed a desire to form a pressure-maintenance unit to repressure the Dakota "J" sand. This sand, at a depth of about 5,700 ft., is the more productive of the field's two pay zones.

The plant will be designed to process 20,000,000 cu. ft. of gas daily and is expected to operate initially at one-half to two-thirds capacity.

Colorado Interstate Gas Co. has contracted to purchase residue gas, pending approval by the Federal Power Commission. The company proposes to build a 53-mile gas line connecting both the Adena field and nearby Little Beaver field with its main line from southeastern Colorado to Denver.

Pure and Lion Oil Co., largest producers in the field, will have slightly more than 60 per cent interest in the project. Among the other major producers involved are United States Smelting, Refining & Mining Co.; Petroleum, Inc.; Falcon Seaboard Drilling Co.; and British-American Oil Producing Co.

Wyoming Strikes Again

CASPER, Wyo.—The second important discovery in recent weeks in the extreme southeastern portion of the Wind River basin is reported to have flowed 110 bbl. of oil per day.

True & Brown 1 State-Klein, 16 miles southwest of Casper in Natrona County, is producing from a stray, unidentified sand at 1,170-79 ft. It is about 6 miles north of depleted Spindletop field. The wildcat went to the Tensleep at 4,029 ft. No shows were found in the Tensleep or Phosphoria.

Wind River basin interest was fired several weeks ago by Forest Oil Corp.'s Grieve Unit discovery 35 miles west of Casper. This was the first big discovery in the basin for some time.

Jetty Almost Finished at . . .

. . . Australian Refinery

AN L-shaped tanker jetty extending 1,000 ft. out from shore is being completed on Cockburn Sound in western Australia to serve the new Kwinana refinery of Anglo-Iranian Oil Co., Ltd.

The first tanker is expected to berth at the structure shortly after the first of the year, bringing crude oil from Kuwait. The refinery itself, a completely new plant of 60,000 bbl. per calendar day capacity, is scheduled to be brought into operation in February.

At the refinery, the two distillation units are now substantially complete. Work on the vacuum unit, catalytic cracking unit, Platformer, and Hydrofiner is well advanced. All major equipment from the United Kingdom and the United States is now on the site, and only a small amount is still to be shipped from eastern Australia. The nucleus for the operating staff of the refinery is being trained in Anglo-Iranian's refineries in the United Kingdom.

Jetty work . . . The jetty construction is one of the largest projects associated with the refinery. It consists of the 1,000-ft. shore arm, an 1,800-ft. sea arm set more or less parallel to the coast, and three short berths further out in water 40 ft. deep at low tide. These berths will accommodate the largest tankers operated by British Tanker Co., Anglo-Iranian's shipping organization. These vessels carry more than 222,000 bbl. of oil.

Some 4,400 tons of steel in 936 boxed piles and 26,000 tons of concrete in the superstructure comprise the materials going into the jetty. A 16-ft. wide precast concrete decking has been laid along the structure, and pipes are installed in a 20-ft. wide track running beside the decking.

Sixteen steel shock-absorbing buffers each about 3 ft. in diameter and backed by a solid 2-ft. cylinder of rubber will be fitted into concrete blocks built into the berths. These buffers will be covered by hardwood finders to prevent damage to the tanker hulls. The piles in the jetty have been coated with asphalt, and a cathodic protection system installed.

Paralleling the work on the jetty and the refinery, suction dredges have been working since January 1953 on the job of providing a channel through the two sandbanks at the entrance to the sound. About 7,500,000 cu. yd. of sand will be removed to make a channel 38 ft. deep.

Lube Plant Readied

Pemex operation will cut down on Mexico's imports

PETROLEOS MEXICANOS' new $25,000,000 lubricating-oil plant at its Salamanca refinery in the State of Guanajuato is expected to be brought into full operation in the next few weeks.

The plant includes a vacuum-distillation unit with a capacity of 14,000 bbl. daily, a deasphalting unit of 5,400 bbl. daily capacity, and a furfural-extraction unit of 4,850 bbl. daily. The MEK solvent-dewaxing unit will have a daily capacity of 2,400 bbl. of lubricating oils and 45 tons of wax.

The vacuum-distillation unit will, in effect, boost crude capacity of the main refinery from 30,000 to 40,000 bbl. daily. Residuum from the unit as well as that from three other main processing units will be available as additional charge stock for the thermal cracking unit at the main plant.

Additional equipment provided at Salamanca include three boilers with a capacity of 150,000 lb. per hour of steam at 275 psi.; three 3,000 kw. turbogenerators (another turbogenerator was installed earlier); a cooling tower with a capacity of 35,000 g.p.m.; and blending and packaging facilities to handle all sizes of containers.

Production from the new plant will meet a substantial part of Mexico's lubricants consumption, which is now almost entirely served by imports.

It will replace those imported supplies now marketed by Pemex itself. Pemex has bought large quantities of lubricants in bulk from United States refiners and canned these supplies for sale in the domestic market. Sales of lubricants by various private companies in Mexico are expected to continue, although an increase in the import duty is considered likely if Pemex finds it is not marketing all of its own production.

Sicilian Field Growing

American International Fuel & Petroleum Co. (Gulf) is preparing location for a fourth well in its new field at Ragusa, Sicily. The location is slightly more than one km. (.62 mile) south of the discovery.

The single rig operating in the area is coring through the oil section at 6,867 ft. in Ragusa 3. Tests indicate this well will be a producer in the 500-600 bbl. daily class similar to the first two wells.

To the west, near the village of Joppolo, Mediterranean Oil Co. (Gulf and Macmillan Petroleum Corp.) is drilling below 5,575 ft. on a wildcat.

Bolivia Gets New Rig

A second rig is being moved to the 970,000-acre Bolivian concession where Glenn McCarthy, Inc., reportedly has completed a well testing about 100 bbl. of oil daily.

The McCarthy well, his second test in the Los Monos area of southeastern Bolivia, produced light oil accompa-

nied by a considerable volume of gas, according to reports from La Paz. Casing was set at 4,508 ft.

According to earlier reports, the second Los Monos well is about ½ mile south of the No. 1 well, which last spring tested three intervals, one of which yielded about 6 bbl. of 51°-gravity oil with a GOR of 125,000 to 1 *(The Oil and Gas Journal, May 3, page 84).*

The undeveloped acreage over which McCarthy obtained a concession in 1953 is in the Gran Chaco near the Argentina border and is divided into the Los Monos and the Agua Salada areas.

Terms of the McCarthy concession required the shipment of two rigs to the country, one for Los Monos and the other for Agua Salada *(The Oil and Gas Journal, November 30, page 51).*

Israel Wildcat

This U-15 rig is being used by Pontiac Petroleums, Ltd., to drill the first test on acreage which the company obtained on a 50 per cent participation basis from Israel Continental Oil Co. The location is about 20 miles north of Tel Aviv in Israel. Pontiac is one of four companies which have started or are about to start drilling in Israel, a rank wildcat area. One of the other companies, Lapidoth Israel, was reported drilling below 5,380 ft., with no oil shows to that depth, at its Beeri 1 in southern part of the country.

Who Controls Refining?

American firms own 36.5 per cent of free-world output outside U. S.; daily capacity estimated at 14,837,300 bbl.

SLIGHTLY more than 70 per cent of free-world refining capacity outside the United States is owned by American, British, and British-Dutch companies.

Figures compiled by the Petroleum Information Bureau in London show a world refining capacity at the beginning of the year of 14,837,300 bbl. daily. The figures were converted from metric tons on the basis of one million tons equaling 20,000 bbl. daily.

Of this, 8,078,800 bbl. daily is in the United States, and an estimated 1,260,000 bbl. daily is in Soviet Russia and other Communist countries, including China. The remainder, 5,498,-500 bbl. daily, represents free-world capacity exclusive of the U. S. The idle refinery at Abadan also is excluded.

British and British-Dutch companies, predominantly Anglo-Iranian Oil Co., Ltd., and Royal Dutch - Shell, own 1,891,720 bbl. daily, or 34.5 per cent, of this total. The largest share—2,010,-220 bbl. daily, or 36.5 per cent—is held by U. S. companies. These American interests are mainly the major international companies or their subsidiaries, Standard Oil Co. (N.J.), Socony-Vacuum Oil Co., Inc., Standard Oil Co. of California, The Texas Co., and Gulf Oil Corp.

The 29 per cent held by other interests is the smallest of the three shares, but it appears to have been expanding at a somewhat faster rate. This reflects recent refinery construction by state entities, particularly in Latin America, and expansion of refinery operations owned by nationals of the country concerned. While total free-world refining capacity rose about 8 per cent over the total at the end of 1952, the capacity held by other than the American, British, and British-Dutch companies was up by some 28 per cent.

Breakdown . . . In western Europe, 863,700 bbl. daily of capacity is held by British and British-Dutch interests, and 459,560 bbl. daily by U. S. companies. Other interests own 737,540 bbl. daily of capacity.

In Latin America, the percentages are British and British-Dutch, 584,600 bbl. daily; U. S., 776,340 bbl. daily; and others, 448,500 bbl. daily. In the Middle East, British and British-Dutch interests held 153,020 bbl. daily, U. S. companies, 450,520 bbl. daily, and others, 27,260 bbl. daily, excluding Abadan. The Iranian refinery had a capacity of about 500,000 bbl. daily when last operated.

British and British-Dutch companies hold 224,400 bbl. daily of refinery capacity in the Far East, and Southeast Asia, while U. S. companies have 102,-600 bbl. daily in this area. Other interests hold 109,360 bbl. daily.

In these figures, capacity is split according to the stock interests where refinery ownership is shared.

Canadian refining capacity is owned 244,800 bbl. daily by Canadian companies, 221,200 bbl. daily by United States companies, and 66,000 bbl. daily by British and British-Dutch interests.

Cuban Test Near Bottom

Cuban American Oil Co. expects to reach projected total depth of 4,000 ft. late this week at its 1 Adelaide wildcat 15 miles east of Sancti Spiritus in Cuba's central basin. The well originally was expected to hit total depth last week.

The well at last report was drilling ahead at 3,150 ft. A small show of oil was encountered in a sand at about 2,900 ft., according to a Cuban American official in Dallas. A drill-stem test was run but the formation proved to be too tight for completion as a commercial producer.

The 1 Adelaide is about 275 miles east of Havana and is only about 8 miles northeast of the Echeverria discovery well, which was completed in a 30-ft. Cretaceous sand section at about 1,080 ft.

Cobb to Enter Cuba

Russell Cobb, Jr., Tulsa independent, last week disclosed he is negotiating for concessions in Cuba totalling 750,-000 acres.

The concessions would involve 400,-000 acres in Oriente Province, about 300,000 acres in Matanzas and Habana provinces, and 45,000 acres in Camaguey.

The Camaguey acreage lies east of the Echevarria 1, Cuba's discovery well near Jatabonico brought in by Kerr-McGee Oil Industries, Inc., for the Jarahueca Group.

Spain Test Dim

Combine's second wildcat has only slight staining

DISCOURAGING results have been encountered so far in the second wildcat test in northern Spain drilled by the Spanish Government in partnership with American oil interests led by General American Oil Co. of Texas.

The Castilfrio test, situated on the Oncala anticline about 15 miles northeast of Soria, at last report had reached a depth of about 6,400 ft., and it was believed that drilling would not be carried much deeper.

This test lies about 75 miles to the southeast of the group's first failure in the Milagro basin east of Logreno.

The only show encountered by the Castilfrio well, a slight staining detected in a core of dolomitic limestone from 4,546 to 4,601 ft., was checked in a drill-stem test which developed only water *(The Oil and Gas Journal, October 4, page 123).*

Others planned . . . The Spanish-American combine has not as yet announced locations for other wildcats, but has revealed that it will continue the search for oil in Spain whether or not the present wildcat is a failure.

American firms participating in the venture besides General American are: DeGolyer & MacNaughton, Delhi Oil Corp., the Caltex group, and several individuals.

Spanish Plans Told

American-Spanish groups to build products system

CONSTRUCTION of a P.O.L. system to serve the complex of American military bases in Spain will be carred out by joint venture organizations, each composed of an American pipeline contractor and at least one Spanish contracting firm.

Brown Raymond Walsh, prime contractor for the Spanish base program, announced last week it had been authorized by U. S. military authorities to set up this procedure for equipping, organizing and constructing the P.O.L. system.

The company said the subcontracting procedure would take advantage of the American contractor's ability to furnish specialized equipment and technically trained personnel together with the Spanish contractor's knowledge of local labor and other phases not requiring major pipeline experience.

Formal invitation to bid is expected in November or December. Interested American contractors, Brown Raymond Walsh said, should associate themselves with an established Spanish contractor in the near future.

The work involves approximately 600 miles of about 10-in. diameter pipeline, pumping stations, and control and communication facilities to produce a multiple products system, and a series of tank farm terminals along the transmission line.

International Briefs

Proposals for the construction of a new refinery in Greece are being studied by Greek Government officials with the assistance of the Washington consulting firm of George Armistead. According to a report from Athens, five proposals were received from United States and West German firms. The proposals also provide for financing and the supply of crude oil. Previous invitation for bids from the Greek Ministry of Coordination called for a completely new 30,000 bbl. daily refinery.

Yacimientos Petroliferos Fiscales Bolivianos, the Bolivian Government oil organization, has contracted with Williams Brothers Sudamericana, Ltd., for the construction of a 6-in. crude line leading south from Camiri field to Yacuiba on the Argentine border. The 6,000 tons of 6⅝-in. pipe for the job was bought from Stahlunion, Dusseldorf, Germany, for $1,164,900. The entire project is to cost around $2,500,000. Bolivia expects to have about 3,000 bbl. daily available for export. The oil will be supplied to Argentina under a recent trade agreement between the two countries.

Marine seismograph work will be initiated in November in the Persian Gulf off the Trucial Coast shaikhdom of Abu Dhabi where Anglo-Iranian Oil Co., Ltd., and Cie. Francaise des Petroles jointly hold an exploratory concession. The seismograph surveys will be conducted from the 405-ton vessel, Sonic, a specially converted landing craft belonging to Geomarine Service Internation.

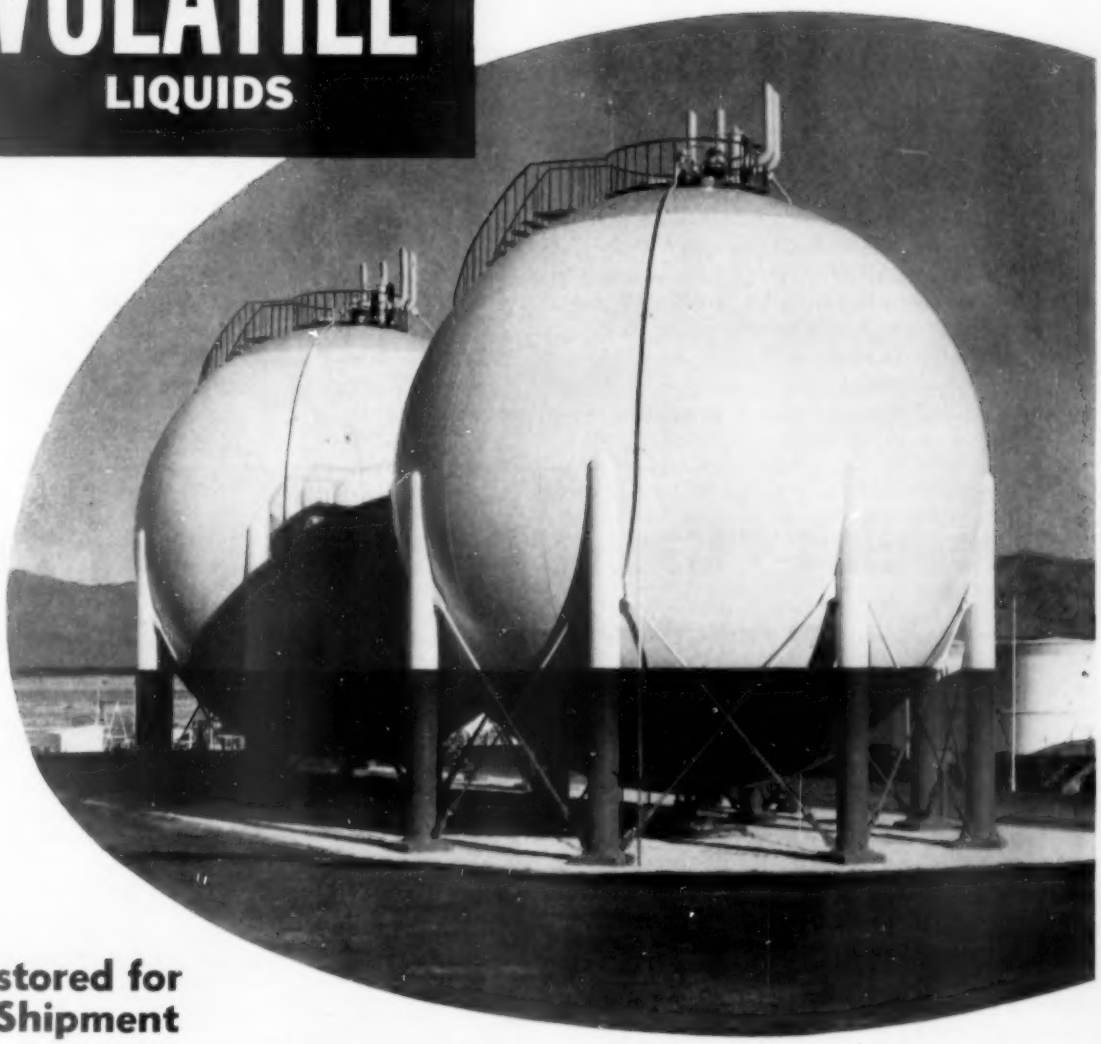
D'Arcy Exploration Co., Ltd., (Anglo-Iranian) has spudded a new well in its continuing exploratory work in Britain. The shallow test is being drilled near Loughborough, Leicestershire. Another rig is in operation at Bottesford, 16 miles east of Nottingham, where a well has been drilled to 2,783 ft. At Plungar, where two wells are producing a small quantity of oil, another well, the sixth in the area, has reached a depth of 2,051 ft.

Some shows of oil have been obtained in a wildcat test being drilled by Swiss interests at Altishofen near Lucerne, Switzerland. The shows were at a depth of about 6,834 ft. in a chalk stratum, but details are lacking. The well was begun about 2 years ago and later suspended at around 5,900 ft. after encountering minor oil shows at about 4,200 ft. The test has been financed by Basel interests.

Baghdad Refinery Gets Pipeline Connection

Iraq Petroleum Co., Ltd., has completed a 132-mile, 12-in. pipeline from its main Eastern Mediterranean system to the new Iraq Government refinery near Baghdad. The new line branches into two 12-in. lines, one a standby in case repairs are necessary on the other. The line joins the I.P.C. main system near the Tigris River (The Oil and Gas Journal, September 13, page 102).

VOLATILE LIQUIDS



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Beginning a five-article series on Hydrofining . . .

This is the first of a series of five papers to be published exclusively in The Oil and Gas Journal on varied applications of the Hydrofining process.

Hydrofining, licensed by Standard Oil Development Co., an affiliate of Standard Oil Co. (N.J.), is one of several hydrogenation processes which utilize byproduct hydrogen from catalytic reforming to upgrade a wide variety of petroleum products and intermediate processing streams. The recent advent of low-cost hydrogen produced inside refinery gates plus the development of low-pressure "mild" hydrogenation techniques now combine to make this versatile new processing tool economically feasible to the refiner.

The current series will reveal for the first time the details of Jersey's process. It will include:

- Lube Hydrofining, by W. A. Jones, Imperial Oil, Ltd.
- Hydrofining of Middle Distillates, by R. C. Morbeck, Esso Laboratories, Process Division, Standard Oil Development Co.,
- Hydrofining of Naphthas, by D. L. Baeder and C. W. Siegmund, Esso Laboratories,
- Hydrofining of Catalytic Cracking Feed Stock, by E. H. Lewis, Esso Laboratories.

The article on processing lubes will appear November 1, and subsequent subjects will be published at intervals of about 6 weeks thereafter, as available.

Hydrofining's Use in Product Improvement

by A. C. Patterson and M. C. K. Jones

HYDROFINING is a versatile process for product improvement. It is based on extensive experimental work by the Standard Oil Development Co. With seven units currently operating—at a capacity of over 55,000 bbl. per day—it enjoys greater commercial application than any other hydrotreating process. A dozen additional units are planned or are under construction.

The increased availability of hydrogen supplies from catalytic reforming and other sources has contributed considerably to this renewed recognition of hydrogen as a treating agent. This reagent improves stability, odor, color, and burning characteristics, and removes sulfur and other corrosive materials.

Versatility . . . Sulfuric-acid treating has long been the classical method of finishing petroleum products. Until the development of Hydrofining, sulfuric acid has been the most important reagent for treating oils because of its cheapness, the possibility of controlling its severity of action by choice of concentration and temperature, and its almost universal applicability to various refinery problems.

Disadvantages of its use, however, are the difficulty of removing refractory sulfur compounds such as thiophenic sulfur, high treating losses, the difficulties involved in getting rid of waste products, incidental removal of some desirable compounds, the need for costly redistillation after acid treating, and the difficulty in obtaining desired selectivity. But Hydrofining will improve product quality without these disadvantages.

Authors are with Standard Oil Development Co., Linden, N. J. Paper presented before the Rocky Mountain Oil and Gas Association, Casper, Wyo., September 3, 1954.

For example, Table 1 compares Hydrofining and acid treating of a 290° to 535° F. product from catalytic cracking of Kuwait gas oil. Hydrofining shows a substantially higher yield of finished product, greater desulfurization, and at least as good stability improvement.

Solvent finishing . . . Hydrofining has been applied to the control of odor, sulfur, and corrosion characteristics of Varsols and various other solvents. For example, Hydrofining of Iranian and Kuwait distillates demonstrated its effectiveness as a means of producing "White Spirit," a high-quality solvent naphtha distributed in the United Kingdom. The extremely severe odor and corrosion specifications were met by this process. The Fawley refinery of the Esso Petroleum Co. currently hydrofines 1,600 bbl. per day of White Spirit.

Virgin naphtha . . . Hydrofining of virgin naphtha is an effective means for sulfur reduction (Table 2). It is easy to reduce sulfur from 0.12 per cent to 0.01 per cent or lower with leaded-octane improvements of 6, or even 10 points. Where further desulfurization is desired—for example, in preparing feed stocks for reforming over platinum catalysts—levels as low as 1 p.p.m. have been demonstrated. These operations produce 100 per cent volumetric yield, and will run for many months without regeneration.

Cracked naphtha . . . Hydrofining of

TABLE 1—HYDROFINING VS. ACID TREATING

	Feed	Hydrofined	Acid treated
Yield, vol. per cent	100	100+	90
Sulfur	1.49	0.26	0.88
Potential gum	115	2	2
G. M. gum	130	2	6

TABLE 2—HYDROFINING VIRGIN NAPHTHA

	Virgin gasoline		Reformer feed	
	Feed	Product	Feed	Product
Sulfur—weight per cent	0.12	0.01	0.15	0.0001
Copper No.	33	0.5	102	0.5
Research oct.:				
Clear	63.5	64.0	50	53
Leaded	75	80.5		

cracked naphtha is carried out for desulfurization and for improvement in stability and engine cleanliness. On catalytic naphthas, substantial improvements in these respects are obtained with little or no loss in octane number (Table 3). In the case of thermal and coker naphthas, desulfurization and stability improvement may even be accompanied by some increase in leaded octane (Table 4). These improvements are obtained under mild operating conditions, with 100 per cent product yield and with over 6 months of operation without catalyst regeneration.

The Bayway refinery of Esso Standard Oil Co. is Hydrofining 8,000 bbl. per day of cracked naphtha. The Baltimore refinery of this company is installing 15,000 bbl. per day for blocked operation with virgin naphtha.

Kerosine . . . Proceeding now to higher-boiling feed stocks, Hydrofining of kerosine effects desulfurization, color improvement, odor improvement, and a reduction in wick char (Table 5). Smoke point is affected greatly by aromatic content and, therefore, is not influenced by hydrotreating unless severe conditions are employed. Again, mild Hydrofining conditions are adequate, yield is 100+ per cent, and catalyst life is over 6 months without regeneration.

TABLE 3—HYDROFINING CRACKED NAPHTHA

	Light cat. naphtha		Heavy cat. naphtha	
	Feed	Product	Feed	Product
Sulfur—weight per cent	0.18	0.02	0.24	0.07
Octane numbers:				
Research (leaded)	94.2	93.2	96	95.5
Motor (leaded)	83.3	83.3	84	84.5
Breakdown (inhib.)	*75	*375	465	1,440+
G. E. gum (inhib.)	15	2	3	0.5

*Uninhibited.

TABLE 4—HYDROFINING CRACKED NAPHTHA

	Heavy thermal naphtha		Thermal-coker naphtha	
	Feed	Product	Feed	Product
Sulfur	0.28	0.12	1.03	0.15
Breakdown (inhib.)	70	1,440		1,400
G. M. gum (inhib.)	12	0.5		
Octane numbers:				
Research—clear	60	53	70.7	66.9
Research (leaded)	70	69	76.2	77.8
Motor (leaded)	64	62.5	72.4	76.1
Bromine No.	34	24	48	33

THE AUTHORS

A. C. PATTERSON

M. C. K. JONES

Albert C. Patterson, assistant director of the process division laboratories of Standard Oil Development Co., graduated from Carnegie Institute of Technology in 1926 with a degree in chemical engineering. Later that year, he joined Standard Oil Development Co. and has since supervised experimental, correlation, and study work. Minor C. K. Jones, a section head in the process division of Esso Laboratories, received his B.S. degree from Johns Hopkins University in 1927 and served on its faculty. He has been with Esso since 1937 when he received his Ph.D. from the Johns Hopkins School of Engineering.

Tractor fuel . . . Tractor-fuel Hydrofining provides sulfur reduction and stability control (Table 6). Color is improved, and clear octane is reduced somewhat in this case. The Fawley refinery of Esso Petroleum Co. has Hydrofined up to 3,700 bbl. per day of a cracked tractor-fuel stream.

Diesel fuel . . . Going still higher in feed-stock boiling range, desulfurization of virgin middle distillate for diesel-fuel production is accomplished by Hydrofining (Table 7). In this example, the sulfur is greatly reduced, diesel index and color are improved, and carbon residue is maintained at a low level. Moderate severity is used, but the yield is still 100 per cent, and over 6 months of operation without regeneration is possible. In addition, a cracked gas oil may be upgraded from fuel to diesel oil by Hydrofining. For example, the Hamburg refinery of Esso A. G. is installing an 8,500 bbl. per day Hydrofining plant on a virgin-cracked gas-oil mixture.

TABLE 5—HYDROFINING KEROSINE

	West Texas crude		Mixed sweet crude	
	Feed	Product	Feed	Product
Sulfur	0.55	0.02	0.11	0.01
Color, Saybolt	+3	+25	+18	+30
Wick char	65	17	31	17
Smoke point	20	20	21	22

TABLE 6—HYDROFINING OF CRACKED TRACTOR FUEL

	Feed	Product
Sulfur	0.51	0.03
Preformed gum (inhib.)	17	4
Potential gum (inhib.)	633	3
Color	20 TR.	+10 S.
Motor octane, clear	78	73
Bromine number	29	6

Heating oil . . . Hydrofining is an extremely effective means for stability and general quality improvement for heating oils and for upgrading cracked gas oils to heating oils (Table 8). Very mild conditions are employed, there is no loss in yield, and again more than 6 months of operation is possible without regeneration. Carbon residue is reduced—but more importantly, carbon-residue blending characteristics and stability are improved.

Esso Standard Oil Co. has installed a plant for Hydrofining 20,000 bbl. per day of heating oil at its Bayway refinery, and 5,000 bbl. per day will be installed at the Baltimore refinery. Humble Oil & Refining Co. has installed 20,000 bbl. per day Hydrofining capacity for processing heating oils at its Baytown refinery.

Feed stock for cat cracking . . . Virgin and cracked heavy gas oils have been Hydrofined to improve catalytic cracking quality. This process permits operating in low-sulfur refineries which are not built to combat sulfur corrosion, and avoids complex treating problems. Typical data from catalytic cracking of raw and desulfurized virgin and coker gas oils in a pilot unit are shown in Table 9.

Note that a 4 to 5 per cent higher gasoline yield is obtained when the desulfurized gas oil is cracked. And this gasoline has a much lower sulfur, a shade higher octane number, and better stability. Moderately severe conditions are required in desulfurizing the virgin gas oil, but the volumetric yield is still 100 per cent, and catalyst life of more than 6 months without regeneration is indicated. The coker gas oil

TABLE 7—HYDROFINING VIRGIN DIESEL FUEL

	Feed	Product
Sulfur	1.4	0.2
Diesel index	48	52
Carbon residue—10 per cent	0.02	0.02
Color, Tr.	14	22
Operating conditions		Intermediate-severe
Volumetric yield, per cent		100 +
Catalyst life		6 months +

TABLE 8—HYDROFINING CRACKED HEATING OIL

	Feed	Product
Sulfur	1.2	1.1
Carbon residue—10 per cent	0.09	0.04
Blending value	0.45	0.04
Stability	0.45	0.04
Color, Tr.	13	17
Operating conditions		Very mild
Catalyst life		6 months +
Volumetric yield, per cent		100 +

TABLE 9—HYDROFINING CHARGE STOCKS FOR CATALYTIC CRACKING

	Virgin gas oil		Coker gas oil	
	Raw	Hydrofined	Raw	Hydrofined
Cat. cracking feed—sulfur	1.8	0.4	4.0	0.4
Cracking yield—gasoline, per cent	40.2	44.6	35.9	41.3
Cat. naphtha quality:				
Sulfur	0.37	0.06	0.78	0.03
Research octane (leaded)	95.8	96.3	96.3	96.5
A.S.T.M. gum	10	6	26	7
Cat. heating oil quality—sulfur	1.6	0.2	4.0	0.3
Hydrofining conditions	Moderately severe		Severe	
Volumetric yield	100 per cent		100 per cent	
Catalyst life	6 months +		2 to 4 weeks then	

requires more severe conditions, and catalyst regeneration is required.

A 26,000-bbl. per day virgin gas-oil unit and a 13,000-bbl. per day coker gas-oil unit are being designed by Standard Oil Development Co. for Esso Standard's Baton Rouge refinery. Incidentally, data are available to show that the middle-distillate fraction from the desulfurization of the coker product is suitable for inclusion in heating oil.

Lubricating oil . . . Hydrofining has been demonstrated to be a suitable process for the total refining requirements of second-line lube oils made from naphthenic crudes. Typical results are shown in Table 10 in comparison with those obtained by acid treating. Note that in every respect, Hydrofining gives a superior product. Operating conditions are of intermediate severity, yield is 100 per cent, and catalyst life is more than 6 months. A plant is being built at the Baytown refinery of Humble Oil & Refining Co. which will process 4,500 bbl. per day of naphthenic lubes; this plant will replace acid treating now employed.

Hydrofining is equally adaptable as a substitute for clay finishing of premium-extracted motor oils. Table 11 shows that Hydrofining is at least as effective as clay contacting. In addition, engine-performance data are available which show the hydrofinished oil to be equivalent to the contact finished product. Again, operating conditions are of intermediate severity, yield is 100 per cent, and catalyst life is more than 6 months. A 2,000-bbl. per day Hydrofiner is planned for the new lube plant at the Edmonton refinery of Imperial Oil, Ltd., to finish a full line of lube oils.

TABLE 10—LUBE HYDROFINING
(S.A.E. 40 grade)

	Feed	Acid treated and rerun	Hydrofined
Color, Tr.	1¼	10¼	17
Colorhold		8½	14½
Neut. No.	1.7	0.02	Nil
Con. Carbon	0.09	0.08	0.02
Sulfur	0.26	0.22	0.12

TABLE 11—LUBE HYDROFINING
(S.A.E. 30—90 V.I. grade)

	Feed	Clay contacted	Hydrofined
Color, Tr.	6¾	14½	21¼
Colorhold	4¼	13¼	19¾
Indiana Life	29	60	60
Slight Sludge	21	7	2

Operating Conditions

As a result of the wide application of Hydrofining, operating conditions vary greatly and comments are accordingly restricted to generalities. Typical operating characteristics fall within the range shown on Table 12.

As would be expected from the variety of problems to which Hydrofining has been applied, the operating conditions vary over a wide range. For some purposes, very mild conditions are adequate or even preferable. For other purposes, more severe conditions are desirable. No one set of conditions, therefore, can be considered typical. It has been possible, however, to obtain the desired results in every case without resorting to conditions that would require alloy equipment.

A number of suitable catalysts are available. For some purposes, cobalt and molybdenum oxides on alumina are effective. For other purposes, other catalysts are better. Catalyst life is from 6 to 12 months, and regeneration is possible, if necessary.

Economics . . . Table 13 shows typical investments and operating costs for Hydrofiners and attendant hydrogen-manufacturing facilities. These are realistic figures based on meeting normal industry standards. They include normal contingencies and contractors' fees. It is obvious from these figures that hydrogen supply is an important factor, and that its importance varies with the type of operation.

The higher investment cost for diesel-fuel Hydrofining in comparison with cracked-naphtha or heating-oil Hydrofining reflects the more severe conditions called for by the greater degree of desulfurization in the diesel case.

An economic study has been made which is of interest in this connection. In one application under consideration, the hydrogen-plant investment was about 45 per cent of the investment for the Hydrofiner plus the hydrogen plant. An alternate way of obtaining the hydrogen was to install a catalytic reformer. This increased the combined investment by only 3 per cent, and would, of course, provide low-cost octane number improvement. When the money saved by not installing the hydrogen plant was subtracted from the cost of building the Hydroformer, the difference amounted to getting a small Hydroformer at a cost of about $33 per barrel.

In another study, a comparison was made between new acid-treating facilities and a new Hydrofiner. When the cost of sludge conversion was included, the acid-treating investment was almost twice as high as the investment for a Hydrofiner and a hydrogen plant. And the operating cost was lower for Hydrofining.

In another case, SO_2 extraction and Hydrofining were compared for diesel-fuel desulfurization. Because Hydrofining removed a much higher percentage of the sulfur, a smaller fraction of the total diesel fuel required treating in the Hydrofining case. The investment for extraction was almost 50 per cent higher, and a considerable amount of potential diesel fuel was degraded to fuel oil. Since there was a difference of almost $2 per barrel between diesel fuel and fuel oil, this degradation was a serious economic debit. The over-all economics, therefore, favored Hydrofining.

Conclusion

The potential of a tremendous amount of research in hydrogenation, experience with a wide variety of feed stocks, and the actual know-how of plants in successful operation is provided in the Hydrofining process.

TABLE 12—HYDROFINING OPERATING CONDITIONS

Temperature, °F.	400 to 800
Pressure, psig.	50 to 800
Feed rate, V./hr./V.	0.5 to more than 16
Hydrogen:	
Feed to reactor, s.c.f./bbl.	up to 3,500
Consumption, s.c.f./bbl.	0 to 700

TABLE 13—APPROXIMATE COSTS OF HYDROFINING

	Investment, $1,000	Direct operating cost, cents/bbl.*
Diesel fuel:		
Hydrofining	1,100	15
Hydrogen plant	1,200	5
Cracked naphtha or cracked heating oil:		
Hydrofining	900	13
Hydrogen plant	500	2

*Includes operating and repair labor, repair material, catalyst, utilities, and fuel.

Los Angeles, San Antonio A.I.M.E. meetings

Engineers Ponder Oil-Production Problems

Petroleum branch meetings of American Institute of Mining and Metallurgical Engineers in Los Angeles and San Antonio, held October 7-8 and October 18-20 respectively, are highlighted by the papers summarized on these pages. To get the news aspects as viewed by Journal editors in attendance, see the issue of October 11 for the Los Angeles meeting, and next week's issue dated October 25 for the San Antonio meeting.

Field Case Histories . . .

Secondary Recovery In Tijerina Unit Successful

N. A. OLANSEN, The Texas Co., Alice, Tex.

GAS injection in the Tijerina No. 3 unit reservoir of Jim Wells County, Texas, is an economic success despite these two adverse conditions:

1. The thin, tight, erratic sand present has retarded the movement of injected gas to such an extent as to develop a 1,500-psi. gradient across the reservoir.

2. Little or no injected gas goes into solution with the remaining reservoir oil; therefore, the viscosity and shrinkage properties of the oil have been adversely affected.

Nevertheless, gas-injection operations in the Tijerina No. 3 unit reservoir have accounted for a considerable increase in the amount of recoverable oil over that anticipated by natural recovery. As of May 1, 1954, 26.4 per cent of the original stock-tank oil in place had been produced as compared with a recovery of 19.3 per cent expected by primary means. It is conservatively estimated that 37.3 per cent of the stock-tank oil in place will be ultimately produced.

Secondary oil produced thus far has cost approximately 80 cents per barrel, less taxes and overhead. The total cumulative cost of unit operation has been about $1 per barrel. Considering the fact that unit production was curtailed for 18 months, it is apparent that the project is economically sound. Success of this project should encourage the instigation of gas injection in other reservoirs of similar characteristics.

Structural characteristics . . . Structurally, this reservoir is a permeability trap laying on an erratic monocline with an average southeast dip of 170 ft. per mile. There is no faulting. present to break the continuity of the sand. The oil column is bounded in the northwest by a small gas cap, but there is no evidence of a water-oil contact in the reservoir.

The sand is firm, fine-grained, and medium to hard, with scattered shale streaks occuring near the strand line. It possesses a low and erratic permeability as substantiated by productivity indices which ranged from 0.020 to 0.114. There are 1 injection and 9 producing wells; The Texas Co. is unit operator.

West Cement Medrano Unit To Double Oil Recovery

A. E. HALL, Phillips Petroleum Co., Bartlesville, Okla.

UNITIZED operations of West Cement Medrano Unit will result in the recovery of twice as much oil as would have been recovered had the field been produced to depletion on a competitive basis. Under pressure-maintenance operations with all produced gas and water returned to the reservoir, ultimate oil recovery is expected to be 50 million barrels compared to 24 million barrels under competitive operations.

Under unitized operations with the drilling of additional wells along the lower edge of the oil reservoir, maximum benefit will be obtained from gravity drainage. Laboratory experiments indicate that gravity drainage forces in the Medrano reservoir will reduce the residual-oil saturation lower than could be achieved by water flooding.

The West Cement Medrano pool produced from a gas cap above an oil reservoir for 6½ years before oil was discovered. It was then produced for 4½ years as a combination pool with both gas and oil wells producing on a competitive basis. The gas wells were voiding several times as much reservoir space as were the oil wells, and it was recognized that should this situation continue, the gas wells would soon deplete the reservoir pressure and only a part of the oil reserve could be produced.

Unitization . . . The pool was unitized with Phillips Petroleum Co. as unit operator on December 1, 1947, and all gas wells and high ratio oil wells were immediately shut in. Selective production operations continued until a gas-compression plant was completed in July 1949, and first gas was returned to the reservoir. Since this date, the pool has been operated under pressure maintenance with all produced gas and water returned to the reservoir.

Success of Medrano Unit operations is evident from its performance. Gas production of 23,000 M.c.f.d. immediately prior to the date of unitization has been reduced to less than 1,000 M.c.f.d. Oil production during the 6½ years of unit operations has remained essentially constant except for reductions in allowable over which the operators had no control. Gas production during this period has been only one-fourteenth as much as was produced prior to the date of unitization, and oil production has been 1.2 times as much.

Cole Creek Shannon Reservoir Is Textbook Case

C. F. GATES, General Petro'eum Corp., Los Angeles and **G. G. BROWN,** Mobil Producing Co., Casper, Wyo.

ALTHOUGH the Shannon reservoir of Cole Creek field, Wyoming, is small, it is of especial interest because it has behaved largely according to engineering calculations. Reasonably complete field data have been secured throughout the 14-year life of the reservoir. It has a limited natural water drive which is being supplemented by water injection, and a definite maximum efficient rate.

Despite the permeability to oil of 30 to 40 md., and 40-acre spacing, the initial pressures of wells completed after the original development were consistent with the current pressure maps.

Calculated pressure-rate performance based on Hurst's water-drive equation for an infinite reservoir coincides with observed performance. An empirical relationship indicates that difference in pressure between the perimeter and the oil-producing area for a given oil rate by water drive is about proportional to cumulative oil produced. Calculated future performance, based on Hurst's equation, the pressure-difference relationship, and the reservoir-oil-rate equation, correctly indicated limitations on maximum oil rate which were not apparent before the calculations were made.

Results . . . Net formation withdrawals have been reduced to about zero by the injection of water. About three-fourths of the injected water rate merely replaces the former natural-water encroachment; the remainder supports increased oil rate.

Productivity indexes are maintained at a maximum by keeping producing pressures at a high per cent of the bubble-point pressure through the use of bubble-point pumps and shut-in casingheads. The maximum efficient rate of the reservoir is automatically produced thereby. Productivity indexes of wells were increased manyfold by shooting.

Indicated recovery efficiency is about 33 per cent but ultimately may be higher.

Production Operation . . .

Oil-Well Casing Protected From External Corrosion

J. D. SUDBURY, J. E. LANDERS, and **D. A. SHOCK,** Continental Oil Co., Ponca City, Okla.

CASING potential profiles which effectively show the extent and magnitude of external, electrolytic casing corrosion, also successfully show that 1 to 5-amp. cathodic current removes all anode areas to 6,000 ft. in all wells studied.

However, application of cathodic protection was shown to cause a severe attack on the oil string opposite the base of the surface pipe. Several possible means of preventing this corrosion have been suggested:

1. A metallic bond between the base of the surface pipe and the oil string should provide a metallic path for the current and thereby eliminate the problem. A means of providing a connection on old wells is not visualized, but placing a centralizer at this point on new wells should provide this bond. This has been

done on one new well but a profile has not yet been run to evaluate its effectiveness.

2. The placing of an insulator between the oil string and surface pipe should prevent the current from the surface pipe to the oil string. This nonelectrolyte would have to be maintained at least a few feet below the base of the surface pipe.

3. If the current can be applied to the casing at the base of the surface pipe, all the pipe above this would effectively be by-passed.

It is believed that the problem of the surface pipe can be solved and should not rule out cathodic protection as a means of preventing external casing corrosion. If a satisfactory solution is found for the surface-pipe problem, cathodic protection apparently will give a very effective and economical means of combatting the problem of external corrosion of casing.

Chemical Removes Water Blocks, Improves Production

A. W. GARST, Stanolind Oil & Gas Co., Tulsa.

A SIMPLE treatment has been developed in which water-block is removed from oil wells by lowering oil-water interfacial tension to a very low value. (See The Oil and Gas Journal, September 13, 1954, page 88.)

The treatment is made by injecting a crude-oil solution of a carefully selected surface-active agent into the water-blocked formation. From 1,000 to 4,000 gal. of crude oil containing 1 per cent surface-active agent is used. Shut-in time following treatment is usually from 12 to 24 hours.

The treatment has been used in 90 wells with successful results obtained in 39 wells representing seven formations in nine fields. The successful treatments have resulted in added productivity of 1,217 bbl. of oil per day. Treatment cost is unusually low, compared with other types of well treatments and workovers normally done for improvement of productivity.

Big Mineral Presents Surface and Subsurface Problems

J. M. GARLICK, Shell Oil Co., Wichita Falls, Tex.

EXPLOITATION of the Big Mineral field in North Central Texas has been and continues to be a challenge to the engineer. The field is partially inundated by the waters of Lake Texoma. Multizone oil production ranging in depth from 3,600 to 10,200 ft. is found in steeply dipping Pennsylvanian and Ordovician sediments.

Based on comprehensive data gathered on early development wells, it was determined that the drilling of separate wells to each of six production horizons was justifiable. To accommodate wells drilled in the lake bed, 32 earthen drilling platforms with earthen access roadways were planned and constructed. Each platform was of sufficient size to allow the drilling of from one to three wells.

Hydraulic artificial-lifting methods, remote control of flowing wells, and semiautomatic, centralized storage facilities were provided so that production would not be interrupted should the earthen platforms be inundated by the lake.

Drilling program . . . To combat crooked-hole conditions, it was determined that the best program to follow was to use oversize drill collars; that is, either 7-in. in 7⅞-in. hole or 7⅞-in. collars in 8¾-in. hole in conjunction with jet bits. In addition, drilling time was improved by allowing hole-deflection limits to be relaxed from 3° for a 7,000-ft. well to a graduated scale of 1° for each 1,000 ft. of hole drilled. Jet bits were also used. These improved procedures resulted in a 45 per cent reduction in drilling time for a 7,000-ft. well.

Rotary rigs are moved off locations as soon as the production casing string is cemented. Actual completion work is performed using a medium-size reverse-circulator completion rig and 2-in. production tubing as the drill string.

New Flow Meter Operates Inside Casing Below Tubing

R. C. RUMBLE, Humble Oil & Refining Co., Houston.

TO meet the need for a subsurface flow meter capable of measuring low rates of flow, a new type flow meter has been built and tested in the field. This instrument is self-contained, can be run on a wire measuring line, and may be run through 2-in. tubing. It consists of a rotameter flow-measuring assembly used in conjunction with a conventional subsurface instrument clock and chart.

Integral with the tool is an inflatable packer which, by effecting a seal between casing and tool, diverts all fluid through the metering assembly. Packers of different sizes adapt the tool to different sizes of casing or liner. The flow meter is capable of measuring rates of flow as low as 4 bbl. per day.

The flow meter has been run experimentally in seven wells. It has yielded satisfactory results in five of the seven wells, and in the other two it failed to operate because of loose sand in the hole.

Gulf Tests Remote Control of Oil Production

C. R. BAYLESS and **J. W. DAUGHTREY,** Gulf Oil Corp., Houston.

FUNDAMENTAL design of automatic controls for offshore or bay-field operation is basically the same as other automatic production installations, but the adaptation of remotely controlling such an installation by a V.H.F. radio link gives rise to future possibilities. The object of the radio is, of course, to relay operating conditions and perform supervisory functions of production equipment in an inaccessible location, thereby permitting unattended operation.

Initial installation of this type was made on the Gulf Refining Co.'s Louisiana State 1772 Lease, Timbalier Bay. Lease storage facilities consist of an oil-storage barge automatically and remotely controlled from the campsite 2 miles away. Eleven wells flow into this barge and are also automatically and remotely controlled. The barge is equipped with a tank switcher, float switches, and the necessary electric valves, together with all components to make up an automatic system similar to that used on land installations. In addition, there are a V.H.F. radio and multiplexing equipment which relay information of producing conditions to the master control station. Control is also available to perform physical operations, such as opening or closing valves.

Power sources . . . Electric power is furnished during normal operations by a 5-kw. gas-turbine generator. When the wells are closed in and gas is not available, a standby engine generator automatically takes over and maintains electric power for radio and control operations. Also a 72-hour battery supply is provided for power for starting-up in case both power units are down.

While the initial installation provides for control of a tank battery to be from a point 2 miles distant, this is a trial installation. With minor modifications, a distance of 70 miles could easily be worked without the use of elevated antennas, making this frequency in the 72-megacycle band very advantageous for offshore operations. The number of indications and controlled functions may also be expanded to meet the problems of offshore production.

Production Equipment . . .

Methods Studies Can Save Money On Lease Operations

H. S. KELLY and **R. C. FILSON,** Phillips Petroleum Co., Bartlesville, Okla.

ECONOMIES can be achieved through methods work on lease-producing operations. Tools and special transportation units can be designed to improve the efficiency of the working force, lengthen life of the lease equipment, and reduce down time.

The old general classification of pumper with broad duties including pumping operations, equipment servicing, and minor repairs can be advantageously replaced with a pumper classification limited only to operating duties on a greater number of wells, plus a properly equipped tuneup and service mechanic whose time would be devoted 100 per cent to tune-up, servicing, and preventive maintenance. This reorganization of actual lease operations resulted in lower total-labor costs, longer life of equipment and less lost production from down time.

The regular lease, surface-maintenance, roustabout work is also subject to organization, special equipment, and transportation units which permit a reduction in cost of maintenance labor and improvement in maintenance of the leases.

Time and methods studies of producing leases in several districts were used as a basis for designing operating and maintenance jobs and for determining labor requirements, tools, and automotive units needed to more efficiently perform these jobs.

Procedure . . . Most effective procedure for improving lease operations and maintenance is:

1. Making detailed methods studies of current operations and determining minimum necessary activities.

2. Redesigning, integrating, and organizing jobs for greater efficiency. Installation of different or improved lease equipment may be justified on the basis of savings to be realized.

3. Providing necessary tools, equipment, and facilities, and properly sized and trained crew for effective and efficient execution of redesigned jobs.

4. Following up with checks and methods

studies to make certain operations and maintenance are being carried out as planned.

Maximum improvement of lease operations and maintenance cannot be achieved if any one of these steps is omitted.

Short Payout for Free Piston In West Texas

J. M. LEBEAUX and **L. F. SUDDUTH,** Stanolind Oil & Gas Co., Midland, Tex.

BY use of a free piston in suitable oil wells, a large capital investment of other types of artificial-lift installations can be deferred or eliminated in many wells producing from volumetric-type reservoirs. At the same time, the cost of the free piston can be amortized within 1 year through the savings in operating costs alone.

The tool is not an answer to all producing problems; however, based on the results to date, satisfactory operation can be secured in many wells producing from solution-gas-drive reservoirs. It has been shown that the piston can operate successfully in some low-capacity wells in which the main purpose of the pump is to agitate the well into flowing. Salvage of a valuable item of equipment results.

The efficiency of the lift can be increased by having a solid interface between the gas and the well fluid, and the tool prevents paraffin accumulation in the tubing.

It is impossible to determine any specific well conditions for optimum piston operation; however, nomograph is available by which it can be readily determined if a well is adaptable to this method of artificial lift.

It is obvious that limiting conditions are availability of sufficient gas volumes and casing pressure buildup characteristics commensurate with the oil-production capacity. Theoretical lift-gas requirements are approximately 225 cu. ft. per bbl. per 1,000 ft. of lift, while actual requirements are approximately 300 to 450 cu. ft. per bbl. per 1,000 ft. of lift.

New Jet Perforates Casing Below Tubing

B. M. CALDWELL and **H. D. OWEN,** Welex Jet Services, Inc.

THE continued use of permanent-type well completion has pointed up the need for more powerful through-tubing perforating equipment. A new, expendable, shaped-charge perforator has been developed in which the charges are run through the tubing in a vertical position and then opened out to a horizontal position when at the desired shooting zone. The performance of this new tool is comparable to that of conventional casing type perforators.

This new swinging jet gun, has increased the scope and effectiveness of permanent-type well completion by providing:

1. A larger charge placed closer to the casing, resulting in larger hole size and greater depth of penetration.
2. Equipment capable of operating at pressures up to 10,000 psi. and temperatures of 300° F.
3. Increased fragmentation of the expendable aluminum parts.
4. No objectionable casing damage.
5. Extra safety features not provided in any conventional perforators.

As a representative field result to be obtained with this new gun, the following actual case history is presented:

A well in the Gulf Coast had been perforated in October 1953, with a conventional-type tubing gun and was flowing 25 bbl. per day at 200-psi. tubing pressure. After perforating on February 5, 1954, with this new gun, the pressure built up to 700 psi. and production increased to 100 bbl. per day where it has remained to date. The recorded bottom-hole temperature of this well was 278° F.

Reservoir Engineering . . .

Highest Oil Recovery Is Below Bubble Point

A. B. DYES, Atlantic Refining Co., Tulsa.

IN the operation of a water-driven reservoir, a free-gas saturation can be established by maintaining production rates fast enough to cause the reservoir pressure to decline below the bubble point. The benefit of such a procedure on the displacement efficiency of the oil and water is illustrated from two types of sandstone samples from one reservoir. Those rock samples showing the poorest recovery to water drive in the absence of a free-gas saturation give the most improvement in the presence of a free-gas saturation.

Employing one type of reservoir fluid (low shrinkage), the benefit of evolved gas on oil displacement is calculated at several reservoir pressures below the bubble point. This demonstrates the presence of an optimum pressure for water displacement which is several hundred psi. below the bubble point.

Displacement of oil at the optimum pressures results in the removal of 7 to 12 per cent more oil than would be obtained by displacement at the bubble-point pressure. In some instances this magnitude of increase may be worthy of consideration in establishing the maximum efficient rate of production from many water-driven fields.

Radioisotopes Used In Multiple Down-Hole Surveys

A. A. ALBERTS, R. D. COCANOWER, C. O. BUNDRANT, Western Co., Midland.

RECENT advances in the technology of the use of radioisotopes has enabled the development of new techniques for oil and gas-well surveys. Almost without limit, these surveys can be designed to answer questions regarding down-the-hole conditions. They have been found to be reliable and relatively inexpensive.

Application of the radiotracer technique requires the running of a reference log of the formation prior to addition of the radioactive material; the adding of the radioactive material to a fluid and pumping it into the well through perforations or into the open hole; the plating-out, or filter-cake buildup, of the radiotracer on the formation; and, subsequently, running several logs to determine the location of the tracer.

By comparison of these several logs, each to the other and to the base log, an interpretation can be made. It is possible, therefore, to locate permeable zones, to detect faulty cement at the casing shoe, to locate fractured zones, to locate communication between perforations, to assure correct location of a blocking agent, and to locate the cement top.

Operational hazards in handling radioactive materials cannot be minimized. However, they can be readily controlled, with little danger to personnel or of contamination of equipment, by the use of Atomic Energy Commission approved procedures.

Radioactive Tracers Locate Zones of Permeability

A. H. FLAGG, J. P. MEYERS, J. P. L. CAMPBELL, J. M. TERRY, Lane-Wells Co., and **E. S. MURDOCK,** Well Surveys, Inc.

RADIOACTIVE tracers in their present state of development and field use add to established logging services a superior method of answering certain subsurface problems. They also add a very detailed picture of subsurface phenomena which, the authors feel, are less conclusively defined by temperature and spinner-type surveys.

To date, this method has been found useful in the following applications:

1. The determination of permeability profiles on water injection wells.
2. The evaluation of perforating jobs.
3. The evaluation of formation-fracturing treatments.
4. The location of leaks through casing and of "thief" zones behind pipe which are taking fluid through casing leaks.

Many other problems encountered in petroleum production are also amenable to the use of radioactive tracers as a source of information leading to successful remedial measures. These involve investigations regarding corrosion problems, gravel-pack migration or plugging, fracture-sand locations, fluid-interface markers, and possibly many others.

There are approximately 25 different radioisotopes suitable for oil-well tracer logging, by reason of their gamma radiation and ready availability. The seemingly infinite variety of chemical and physical preparations using these radioisotopes should allow their use in many applications not yet considered.

Nonuniform Limes Get Higher Recovery Below Bubble Point

C. R. STEWART, E. B. HUNT, JR., F. N. SCHNEIDER, T. M. GEFFEN, and **V. J. BERRY, JR.,** Stanolind Oil & Gas Co., Tulsa.

LABORATORY tests indicate that recovery efficiency by solution-gas drive in nonuniform-porosity limestones increases with an increase in the number of gas bubbles formed. Moreover, pressure-decline rate is the important factor in establishing the number of gas bubbles formed.

No practical laboratory test is available to measure the solution-gas-drive oil-recovery performance at field rates of pressure decline. However, it is postulated that laboratory data on external-gas drive can be used to make a conservative prediction of field performance for nonuniform-porosity limestone reservoirs with solution-gas drive.

It is indicated that increased field-oil recoveries may be obtained from nonuniform-porosity limestones by rapidly reducing reser-

voir pressure for a short interval of time. It has yet to be established that significant improvements in oil recovery from such reservoirs can be realized by varying the pressure-decline rate within limits possible in the field. However, the possibility that recovery may be increased in this manner warrants further study.

Reservoir Model Studies . . .

Injection Fluid Contacts Almost All Of Reservoir

B. H. CAUDLE, R. A. ERICKSON, R. L. SLOBOD, Atlantic Refining Co., Dallas.

IN predicting the sweepout-pattern efficiency to be expected in a secondary-recovery operation, the reservoir engineer is often confronted with a situation in which part of the producing formation lies between the last row of wells and the reservoir boundary.

Results of a laboratory study in which the x-ray shadowgraph technique was used, show that surprisingly large portions of the reservoir area lying outside the well network are contacted by the injected fluid before abandonment conditions are reached. In fact, it can be said that at least 90 per cent of the area lying outside the last row of wells and within a distance of one well spacing of these wells will ultimately be contacted by the injected fluid in the case of most water floods.

From the results of these studies it is possible to estimate not only the extent to which encroachment into these areas will occur but also the injection volume necessary to produce the wells to abandonment conditions.

Model Tests Show Recovery of Pattern Injection

F. F. CRAIG, JR., T. M. GREEN, R. A. MORSE, Stanolind Oil & Gas Co., Tulsa.

A SERIES of both water and gas pattern floods was made in the laboratory to study the oil-recovery performance of such operations. These tests were conducted on consolidated sandstone models, using oil, water, and gas. The model floods were scaled to reproduce field performance under gas and water five-spot injection. X-ray shadowgraphs permitted observation of the gross fluid movement within the models.

A method was developed for applying the mobility-ratio concept to water flooding and dispersed gas drives in a five-spot well pattern. The areal sweep efficiency at breakthrough for dispersed gas drives is much higher than previously expected, lying in the range of 50 to 100 per cent.

A method was also developed for predicting the water-oil-ratio performance of five-spot pattern water floods in uniform sands. This method is verified experimentally for the condition of no free gas initially present and for values of gas saturation normally encountered in fields following depletion operations. Production performance for pattern gas injection is also predictable by this method.

A laboratory study, using a miniature oil field, was made to determine how oil recoveries from a pilot flood can be used to evaluate oil recoveries from field-wide flooding. Model tests show that a single five-spot water flood, suitably located, will yield oil recoveries approximating those by full-scale operations, if the producing ability of the inside pilot well is not restricted and if the water advance from the injection wells is uniform.

"Kerosine Flood" Uses Circulation Process

J. OFFERINGA and **C. VAN der POOL,** Koninklijke/Shell - Laboratorium, Amsterdam.

SCALED-MODEL experiments have been conducted on the recovery of oil from porous sands by the injection of miscible liquids (solvents) and the subsequent recovery of the solvents by water flooding. Although high oil recoveries are obtained and most of the solvent in the sand can be recovered by a subsequent water-drive, a straight flood with miscible liquids does not appear economically attractive because of the large quantities of solvent required.

Therefore, a circulation process has been developed by which the amount of solvent required can be drastically reduced.

Breakthrough recoveries obtained when flooding with kerosine as a solvent, are equal to those obtained in water flooding at the same viscosity ratio, indicating that the phenomenon of viscous fingering is decisive. After breakthrough, however, flooding with a miscible liquid becomes much more efficient than a water flood and this is more pronounced as the viscosity-ratio oil-solvent is higher.

Model experiments on the displacement of oil by a miscible liquid (solvent) should not be carried out on too small a scale. In the tests reported, results with tubes of 1.60 and 3.00 m. length were in good agreement, whereas those with a 1.03 m. tube showed appreciable deviations.

Fracturing and Completions . . .

Squeeze-Pack Process Controls Incompetent Sand

H. B. RITCH, Dowell Incorporated, New Orleans.

A SAND control process has been developed and field proven in the Gulf Coast. The mechanics of the application involve the use of a gel oil (or gel acid or gel water) as a vehicle to carry sand into or against the formation which has or is expected to produce sand.

This process is carried on beneath a squeeze tool in order to cope with pressures which might otherwise be usafe and to make it possible to pack a formation without mud or water contamination. After the formation is satisfactorily packed, the packing sand is held in place by a screen liner or sand-consolidation plastic.

These sand-control procedures have been employed in many wells of the Gulf Coast area, and have resulted in successful control of formation sand in approximately 85 per cent of the wells treated.

Advantages . . . This technique has a number of advantages over other sand-packing methods. It can be seen that little, if any, fluid other than the gel will enter the formation, using this procedure. Large quantities of sand can be placed into or against the formation in a minimum amount of time. As a result, rig, service company, and other workover expenses are much lower.

By using a squeeze tool and high-pressure pump, it is possible to apply whatever pressure, within reason, is necessary to force the sand through the perforations. On the other hand, these same tools are ideal for wells on vacuum to prevent loss of undesirable well fluids into the formation.

The gel carrier minimizes the possibility of solids bridging in the tubing and makes it possible to reverse out easily after maximum pressure has been reached. High fluid velocities are not necessary to cause the sand particles to move through the perforations. Cleanup time is materially reduced due to the smaller amounts of fluid required by this method.

Big Frac Jobs Make Many Spraberry Wells Economic

T. P. BROOKS, P. C. O'QUINN, W. E. LIFE, Southern Production Co., Inc., Fort Worth.

THE application of relatively large-volume fracture treatments using an oil-sand mixture at high injection rates in wells completed in the Spraberry formation has indicated improved drainage from the matrix rock. This is considered to result from enlargement of existing open fractures, possibly from opening of fractures not previously effective and breaking down existing blockage in the vicinity of the well bore.

In one section of the Spraberry Trend area field such treatments, when applied in wells completed in the upper Spraberry formation result in an increased rate of production which is maintained long enough to return the cost of the treatment and for an indeterminate period thereafter. This result is accompanied by little change in the performance trend of formation pressure, gas-oil ratio, or percentage of water produced.

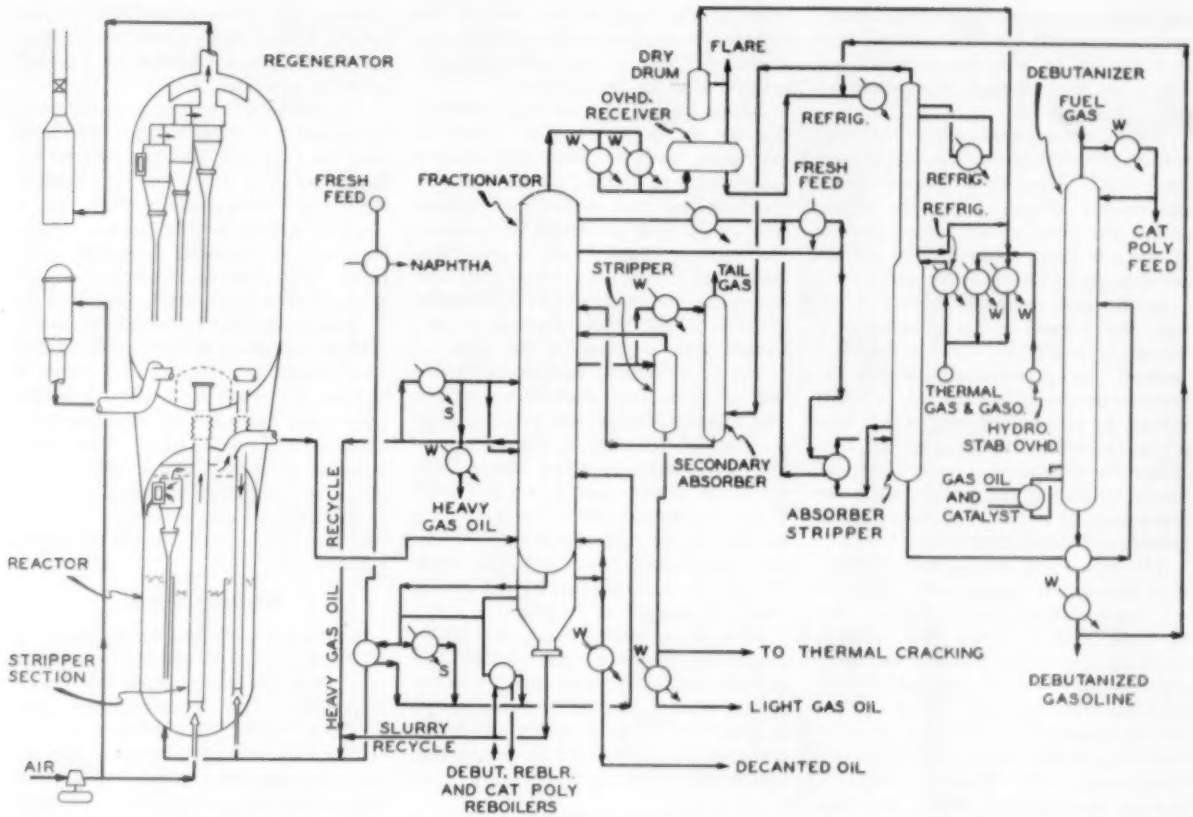
Fracing Improves Injectivity, Doesn't Harm Sweep Efficiency

G. E. ROARK, J. D. LINDER, James A. Lewis Engineering, Inc., Dallas.

AFTER 17 months of water flooding in Young County, Texas, in Langston-Kleiner 3,550-ft. sand, it is concluded that the degree of fracturing applied in this field has resulted in providing satisfactory injection rates through perforations and in open hole. It is probable that injection capacity has been increased in certain wells in which the sand development is poor. The necessity of shooting with nitroglycerin and the expense of cleanouts has thus been eliminated.

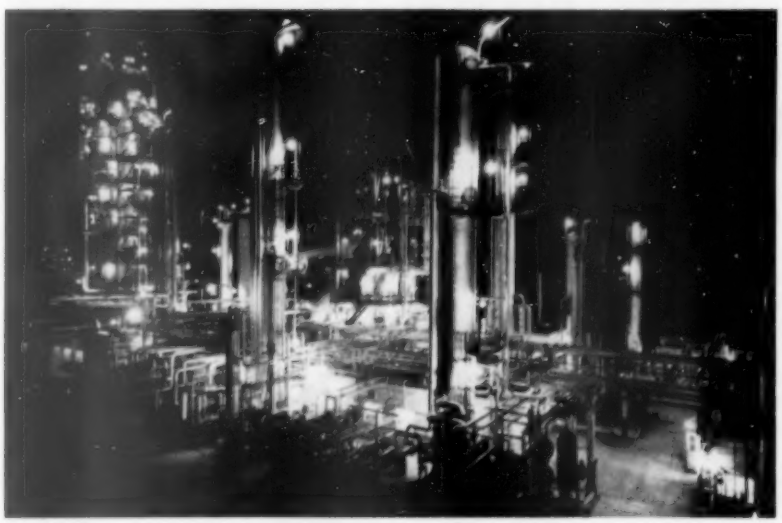
The breakthrough performance to date, accented by the lack of breakthrough over the major portion of the flood area, indicates that no detrimental effect on sweep efficiency is resulting from fracturing applied in this field.

This should not be interpreted as universal endorsement of fracture treatments in water-flood operations. Consideration of reservoir conditions and size of fracture treatments should be made and will undoubtedly have a bearing on the technique of flooding. However, as demonstrated here, past application of fracture treatments in a field does not necessarily eliminate the prospect of a successful water-flood operation.



THIS new Pure Oil Co. Model B Orthoflow cat cracker has a throughput capacity of 17,500 bbl. per day total, including 11,600 bbl. per day of fresh feed.

Pure Oil Adds Octanes With . . . New Model Orthoflow



ENTIRE catalytic cracking installation is shown here: the Model B cat cracker; main fractionator; and gas-recovery equipment.

Improvements in both yield and quality of gasoline product has resulted from Pure Oil's use of the first commercial Model B Orthoflow cat cracker. Here's a brief description of the unit's operation.

by George Weber
Refining Editor

THE first commercial unit of the new Model B Orthoflow fluid catalytic cracking process has now been in operation for 9 months at Pure Oil Co.'s Toledo refinery. The unit has been fully incorporated into the refinery operation, permitting Pure to improve both the yield and quality of gasoline product.

The Orthoflow design, developed and licensed by M. W. Kellogg Co., of New York, places the reactor and regenerator in a single vertical structure. This arrangement provides straight-line flow

of catalyst between the vessels thereby reducing catalyst erosion. Catalyst flow is controlled by plug valves which are fabricated from erosion resistant materials.

Several commercial units of the original or Model A Orthoflow design have been built. This model superimposes the reactor directly above the regenerator, the latter vessel being operated at about 8 psig. above desired reactor pressure to afford proper balance.

In the new improved Model B design, the regenerator is positioned at the top, directly over the reactor. This reverses the pressure differential between regenerator and reactor, in effect raising the suction pressure of the compressor handling reactor gas, and lowering the discharge pressure of the blower furnishing combustion air to the regenerator. The net result is a marked reduction in operating costs.

The new Pure unit at Toledo has a total throughput capacity of 17,500 bbl. per day including 11,600 bbl. per day of fresh feed. It is the first catalytic cracking unit to be built at the refinery. The new unit is operated in combination with two-stage crude distillation, delayed coking, thermal cracking, catalytic polymerization, fixed-bed hydroforming, and alkylation facilities, making the refinery one of the most modern and flexible of any of its size in the nation.

Crudes charged to the 29,400-bbl. per day refinery comprise mainly intermediate sweet West Texas and Mid-Continent stocks plus some higher-sulfur Rocky Mountain production. Fresh catalytic feed stocks comprise four straightrun streams which include light, intermediate, and heavy atmospheric and vacuum gas oils from the crude units and light and heavy coker gas oil from the delayed coker.

Operating Features

The accompanying figure illustrates the schematic flow of the unit including gas-recovery facilities.

Fresh feed is preheated to 360° F. by exchange with cracked naphtha recycle and heavy-gas-oil streams. Combined feed at 420° F. is admitted to the reactor through 20 individual feed-injection nozzles which provide distribution in the base of the vessel. The reactor bed operates at 15 psig. and 925° F. Cracked vapors from the stripper section and reactor proper are disengaged from catalyst in one-stage cyclone separators and are charged directly to the unit fractionator.

Spent catalyst is withdrawn from the reactor bed through wall openings in the central stripping section, where hydrocarbon vapors are removed by stripping steam. The spent-catalyst plug valve at the base of the riser to the regenerator automatically controls the withdrawal rate to maintain a desired catalyst level in the reactor.

About 25 per cent of total combustion air to the regenerator is used to lift spent catalyst from the reactor vessel. Lift air enters the base of the spent-catalyst riser through the hollow stem of the plug valve and the catalyst-air mixture enters the regenerator through a central distribution grid. The remaining combustion air is admitted directly to the vessel through a perforated ring surrounding the grid.

The regenerator is equipped with five sets of three-stage cyclone separators. The regenerator operates at an average pressure of 10 psig. In normal operation, average temperatures range from 1,105° F. in the catalyst bed to 1,080° F. at the top of the vessel with flue gas leaving the regenerator at 1,050° F. Air requirements which averaged about 32,000 s.c.f.m. were met by the blower which discharged at 19 psig.

Heat is recovered from the disengaged flue gas in a steam boiler. The gravity return of regenerated catalyst to the reactor through two standpipes is controlled by plug valves which are automatically positioned by the reactor temperature controller.

Heat Economy

Additional heat economy is realized for process and steam generation from withdrawal and reflux streams from the unit fractionator. Fractionator overhead comprising gasoline and light ends passes to the recovery system which employs an absorber stripper, a secondary absorber, and a debutanizer.

The recovery system operates on catalytic cracked product plus a relatively small quantity of extraneous liquid and rich gas to the system at the absorber stripper.

These outside streams comprise thermal cracked light ends, straightrun vapors, and stabilizer overhead from the fixed-bed hydroformer. The latter two are rich in isobutane which serves to build up the content of that component for alkylation.

Overhead gas from the absorber stripper is contacted with a cooled side-stream of lean oil which is refluxed back to the main fractionator. After final stripping, tail gas is fed to the plant fuel system.

Rich oil from the absorber stripper passes to a debutanizer which obtains reboiler heat from a catalyst slurry reflux stream from the main fractionator. Debutanizer overhead, consisting of propane, propylene, butanes, and butylenes combined with straightrun debutanizer overhead represents the feed to the catalytic polymerization unit or alkylation unit. Debutanizer bottoms, following caustic treating and water wash, are withdrawn to storage as finished catalytic gasoline.

A naphtha reflux stream on the main fractionator exchanges heat with fresh catalytic feed and absorber stripper reboiler bottoms. Light gas oil is withdrawn as heating-oil product, or is charged directly to the thermal cracking unit to maintain seasonal flexibility. A fraction of the heavy gas oil is recycled to the reactor. Decanted oil is withdrawn and blended to heavy fuel oil. The heavy reflux gas oil-catalyst slurry from the base of the tower is utilized for fresh feed preheat, steam generation, and heat for reboilers operating on light-ends units. The slurry bottoms fraction diluted with heavy gas oil is completely recycled. The unit is operated at a conversion of about 70 per cent, with total recycle of heavy gas oil.

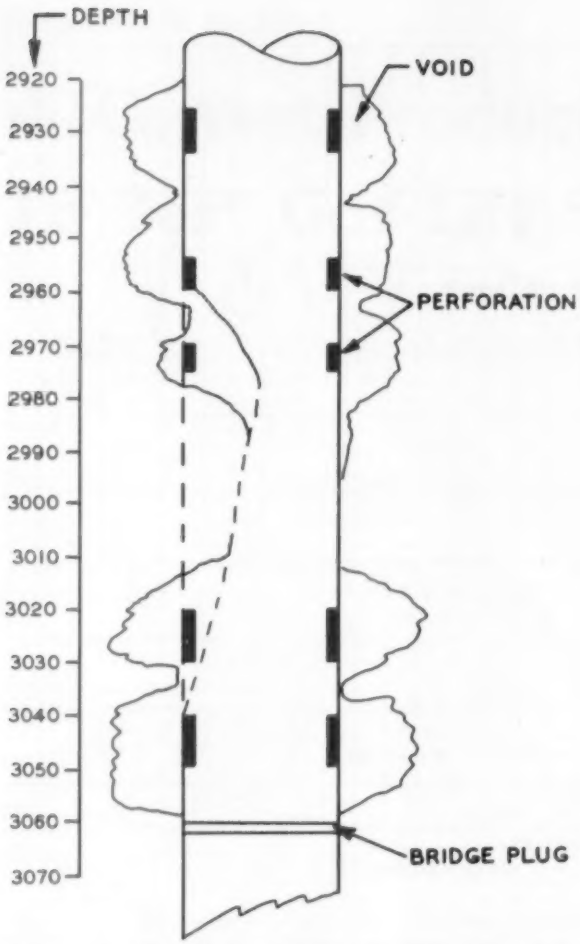
Recovery System

In the recovery system, propane refrigeration is substituted for water cooling in the absorber stripper side-stream condensers. This lowers lean-oil temperature to 50° F., improving absorption efficiency and reducing the required circulation rate of lean oil. Accumulators are placed above condensers for flooded condenser operation.

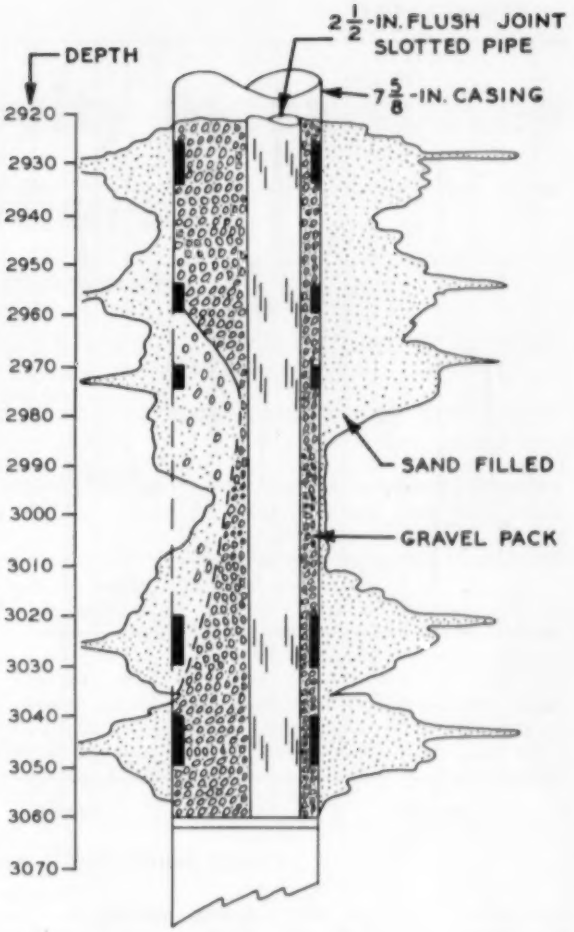
The new polymerization unit converts over 90 per cent of olefins in the combined feed to polymer gasoline. Polymerized product and unreacted light paraffins are charged to a depropanizer which separates L.P.G. Debutanizer overhead, comprising a high content of isobutane, is charged to the sulfuric acid alkylation unit. The hydroformer, which ties into the new unit only by providing some debutanizer overhead to the absorber stripper, is operated on straightrun and coker naphthas.

In conjunction with existing thermal cracking facilities and a new vacuum unit, the catalytic cracker has substantially improved the light distillate yield of the Toledo refinery and has added measurably to its octane potential. Heavy fuel oil, comprising straightrun vacuum bottoms cut back with decanted oil and thermal cracked light cycle stock, can now be held to about 8 per cent of crude charge.

The Orthoflow unit, gas-recovery system, and new polymerization facilities were constructed by M. W. Kellogg. At present, a total of 13 Orthoflow catalytic cracking units with an aggregate fresh feed capacity exceeding 175,000 bbl. per day have been contracted by Kellogg. Of these, eight are in commercial operation in the United States and abroad.



BEFORE . . . The casing was found in this condition during the cleanout, apparently damaged by collapse. Moreover, sand control was necessary to avoid abandonment of the zone prior to depletion. Fig. 1.



AFTER . . . This is the producing zone after fracture packing. The well subsequently pumped approximately 60 bbl. per day for 2 months without pulling and no sand has been detected. Fig. 2.

Fracture-Packing Cures Sand Headaches

by John D. Forsythe

SAND control has been a major operating problem during the 35-year production life of the Cities Service Oil Co. Barngrover lease in Hull field, Liberty County, Texas. However, a combination of sand fracture and pressure gravel pack apparently will provide sand control and will reduce the number of workovers on a given well.

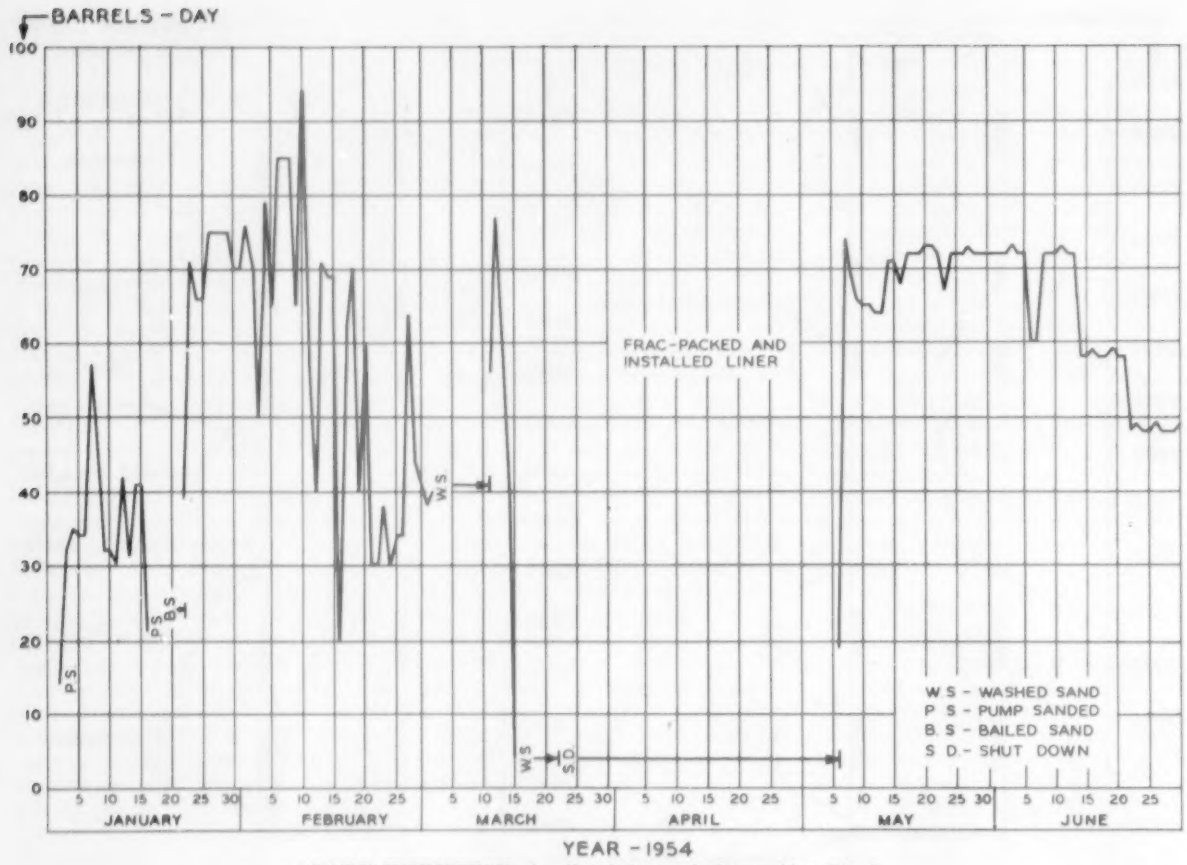
This field is situated on the Hull salt dome and the oil production is from the unconsolidated Yegua and Cook Mountain sands. These sections consist of fine-grain to silty sands with shale—commonly called dirty sands.

Author is with Cities Service Oil Co., Bartlesville, Okla.

Previous attempts unsuccessful . . . The history of the Barngrover lease, and Hull field, contains many methods of sand control. These varied from wire-wrapped casing screen and casing gravel pack to filter sections below the pump. They are all fundamentally filters and often plugged with sand and silt. Some had a high pressure drop across the filter and, when the bottom-hole pressure dropped, also filtered out the oil. During recent years, a certain amount of sand contro! was obtained by controlling the rates of production and the resultant hydrostatic head. The rate of withdrawal controlled the well bore or sand-face velocity and the hydrostatic head had a tendency to hold the sand in place. The exact combination was often difficult and costly to find.

In addition to sand trouble, several zones in this field have been abandoned prematurely because of casing failure. These failures were apparently caused by formation shift or by movement of the overburden into the void space around the casing, which was made by sand produced or removed during cleanout.

Frequent workovers costly . . . Cities Service well A was plugged back to a new zone, and cleanout frequency



DAILY PRODUCTION of well A before and after packing. Fig. 3.

averaged 1.5 times per month during the ensuing 4½ months. During the last cleanout, the casing was found damaged—apparently by collapse—and it was apparent that some form of sand control was necessary to avoid abandonment of the zone prior to depletion. The condition of the well as visualized from the surface is indicated in Fig. 1.

The pressure-pack method of gravel packing offered the best solution to the problem, since a void space might be expected behind some of the perforations; and also because of the success of this method in filtering the fine-grained sands.

Again considering velocity control, it was postulated that if the effective sand-face area could be increased by sand-filled fractures, the relative velocity of fluid to sand could be reduced, and it should effect some reduction in sand movement. This would reduce the filtering requirements of the gravel pack and increase its efficiency. An additional possibility was that the fractures might extend into another section of the highly faulted and lenticular zones in this area and increase the ultimate recovery.

Combination fracturing and gravel packing . . . The physical procedure of sand placement began as a regular sand fracture with lease oil as the carrier. This is a 34°-A.P.I.-gravity sweet crude, and it was apparently an adequate sand vehicle at the 140° F. bottom-hole temperature. A squeeze tool was used in this particular well, but, if fracture and placement pressures are not excessive, the bradenhead squeeze method would permit placement of the casing sand following the fracture pack. Extensive fracturing was not attempted, since sand filled fingers should be sufficient to reduce the relative fluid velocity. After the desired amount of sand was squeezed, the sand was permitted to "screen out" for a gradual changeover to the pressure-pack type of gravel pack. The screen out may be accomplished by slower injection rates, shutdowns, carrier viscosity control, etc.; and the desired method would probably depend upon well conditions; such as shot density, length of perforated interval and the interval between perforated sections.

The necessary amount of sand was then placed in the casing and the liner and screen washed to the setting depth in the usual manner. Fig. 2 indicates the condition of well A after the fracture pack. Well A has pumped approximately 60 bbl. per day for 2 months without pulling and no sand has been detected. Fig. 3 shows the daily production of well A before and after packing.

Successful workovers in field . . . Cities Service well B was packed using the same technique, and the 30 days of sand-free production indicates mechanical success.

Well C, also in Hull field, flowed approximately 15 bbl. per day for 10 days after fracture. Since completion of the pack by screen placement, the well has reportedly pumped 10 to 15 bbl. per day.

The same technique was used on well D in South Liberty field, which is also Yegua production. The sand vehicle was lease crude with a viscosity increasing additive, and the larger-gage sand was used during the final stage of treatment.

Prior to treatment, this well had pump wear caused by sand and sand settled in the fluid traps. The 4 bbl. per day prior to treatment was increased to 19 bbl. per day oil with .8 of 1 per cent B.s. and w.; and it is considered successful.

A Correct Productivity Index Is Key To Best Gas-Lift Efficiency

by Prof. C. V. Kirkpatrick

IF the expected design performance of the continuous-flow installation is to be realized, the well productivity index (P.I.), as used in the design analysis, must be approximately correct. Field experience has shown that determination of a reliable P.I. is difficult. Consequently, many "first try" design installations will be incorrect, unless some of the possible difficulties are foreseen before the valve string has been run.

It is the purpose of this discussion, therefore, to analyze a well installation with a view toward determining what operating problems will be encountered, if the actual well P.I. is (1) one-half, and (2) twice the design P.I. This analysis will serve to reemphasize that valve spacing as such is academic; it is valve location that is important. Also, selection of the proper type valve and proper valve-port size for a given installation is very significant.

Fig. 1 has been plotted to illustrate what actually happens when the P.I. is one-half, two-thirds, or twice the design P.I. The illustration is one presented previously in Installment 3 in which a design P.I. of 1.0 was used, for an oil-producing rate of 40 bbl. per day with a water-oil ratio of 10:1. The final operating valve was placed at 3,800 ft. and the necessary injection pressure is 575 psia. with an injection gas-oil ratio of 3,810 cu. ft. per bbl. of stock-tank oil.

Author is chairman, department of petroleum engineering, University of Houston.

P.I. cut in half . . . Now assuming that the actual P.I. of the well was only one-half of the design P.I., certain facts become evident.

To obtain the design production from the final operating valve, the bottom-hole flowing-pressure drawdown must be doubled. This is manifestly impractical because, as seen from Fig. 1, the injection pressure would have to be lowered to 125 psia. and this would in turn necessitate an impossible increase in the injection gas-oil ratio. (Refer to Fig. 2, previous installment.)

Even lowering the tubing pressure to 25 psia. would provide no appreciable help, as the resultant gas-oil ratio would require gas in excess of the amount the valve could pass for the injection pressure needed. Therefore, the desired oil production could not be obtained for the given design conditions.

More drawdown . . . If the flowing bottom-hole pressure were reduced until the drawdown (ΔP) is one and one-half times the design drawdown and the P.I. remained 0.5, fluid production would be only 330 bbl. per day, or 25 per cent less than the design rate of 440 bbl. per day.

For this condition, an injection pressure of only 350 psia. could be used. To obtain a work efficiency comparable with the design work efficiency, a proportional injection gas-oil ratio must be determined. To approximate this injection gas-oil ratio, assume the adiabatic work to be proportional to the produced liquid.

That is, let:

$$W_A = \frac{330}{440} W_D$$

where:

W_A = work under actual flowing conditions of 330 bbl. of fluid per day.

W_D = work under design conditions of 440 bbl. of fluid per day.

And from previously derived equations (see Equation 1, Installment 4):

$$W_A = \frac{144\, P_A V_A}{1 - k} \times [(P_A/P_T)^{(k-1)/k} - 1]$$

where P_A and V_A are the actual injection pressure and volume at injection pressure, respectively, and other terms as previously defined. Also:

$$W_D = \frac{144\, P_D V_D}{1 - k} \times [(P_D/P_T)^{(k-1)/k} - 1]$$

where P_D and V_D are the design injection pressure and volume at injection pressure, respectively. Then, combining the equations and solving for the actual volume, we have:

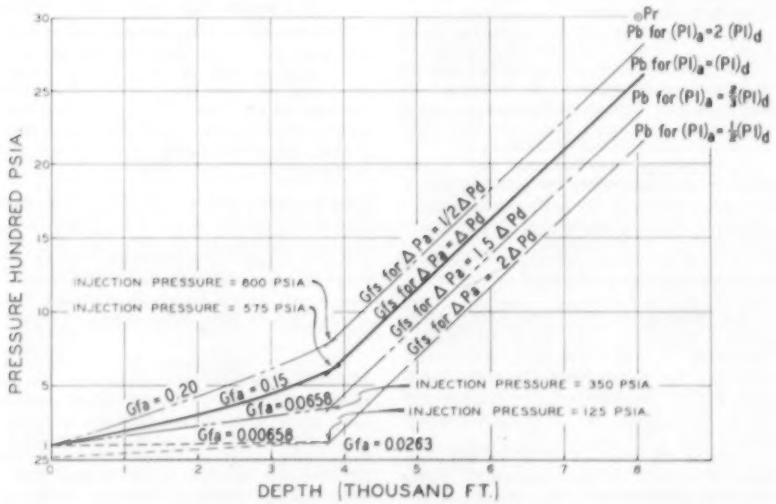


Fig. 1—These plots illustrate the significance of the actual well productivity index (P.I.) differing from the design productivity index. The subscripts "a" and "d" refer to actual and design conditions, respectively.

$$V_A = (0.75)\frac{P_D V_D}{P_A}$$

$$\times [(P_D/P_T)^{(k-1)/k}-1]/[(P_A/P_T)^{(k-1)/k}-1]$$

$$= \frac{0.75 \;\; 575 \;\; 108}{350} (0.498/0.336)$$

= 133 cu. ft. per bbl. S.T.O. at 350 psia. and 130° F. at the point of gas injection. Converted to standard cu. ft.:

$$V_A = (133)\ (350/14.65)\ (520/590)$$

V_A = 2,800 cu. ft. per bbl. of oil.

This then would be a reasonable approximation. The injection pressure should be carefully controlled in order that the desired injection gas-oil ratio could be maintained.

Obviously, this valve cannot operate under the above conditions if it has been placed in the well under the original design calculations. The illustration has been presented in order to show the mechanics of the operation and to emphasize the advantage of valve installations in which the valves may be retrieved and reset or replaced.

What to do about it . . . In an actual well in which the P.I. is less than the design P.I., trouble will be indicated as soon as the operating valve is reached; the gas-oil ratio will be excessive, the well-head pressure high, and the flowing gradients low. The trouble-shooting procedure would be:

1. Determine the operating valve depth.

2. From actual producing gas-oil ratio and well data plot actual flowing gradient above the point of gas injection.

3. Extend flowing gradient to injection depth.

4. From this point, draw the actual flowing gradient below the point of gas injection approximately parallel to the design flowing gradient below the point of gas injection.

5. Extend this gradient to total depth to arrive at the bottom-hole flowing pressure from which the actual P.I. can be determined.

6. Make a new analysis for correct valve location.

Greater P.I. . . . When the actual P.I. is twice the design P.I., drawdown is only half design drawdown. In the example case, Fig. 1 shows that an injection pressure of approximately one-third more (800 psi. as compared to 575 psi.) would be necessary to operate the final operating valve. This means, of course, that the valve would not be uncovered. Operation would then be from one of the upper valves in the string. In this case, it would be desirable to place a valve at 3,100 ft. as indicated in Fig. 1.

A careful study of well characteristics prior to the initial design will generally indicate the reliability of the P.I. In order to avoid the stymie condition of the well's P.I. being different from the design P.I., use maximum design pressure and bracket the final operating valve with wire-line retrievable valves. The final operating valve should also be of the wire-line retrievable type.

Keep in mind that for wells the P.I. of which is actually less than the design P.I., the flowing gradient above the point of injection decreases and lowering of the tubing back pressure usually will be of little help.

Low injection pressures mean high injection gas-oil ratios and should be avoided where possible. When low injection pressures are necessary, however, an attempt to achieve maximum flow efficiency should be made by (1) determining the optimum injection volume in the manner described, and (2) carefully controlling injection volume by means of the injection pressure.

BOOKS

ELEMENTARY CHEMICAL ENGINEERING. By Max S. Peters. Published by McGraw-Hill Book Co., New York. 322 pp., $6.

This book presents a unified picture of chemical engineering for persons without experience or training in the subject. The basic principles are presented in a manner to make them easily understood by beginners. The development, interrelationships, and practical applications of principles are explained in simple terms.

This is the first text to cover the entire field in an elementary fashion through all essential parts of chemical engineering, starting with an over-all appraisal of the profession and extending through stoichiometry, typical equipment, unit operations, chemical technology, economics, and plant design.

To emphasize the fact that the various subjects are interrelated, a separate section on equipment is included. Here the reader is given the physical concepts of the equipment used in the over-all process.

Unusual emphasis is placed on the practical applications of the principles.

TOP MANAGEMENT ORGANIZATION AND CONTROL. By Paul E. Holden, Lounsbury S. Fish, and Hubert L. Smith. Published for the Stanford University Graduate School of Business by McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York 36. 257 pp., $5.

Subtitled "A research study of the management policies and practices of 31 leading industrial corporations," this text is an outstanding presentation of the best in modern management practices. Specifically limited to the problems of top executive management, the study was carried out by Stanford University's Graduate School of Business with the cooperation of 31 "blue chip" corporations in varied fields of industry.

The objective of the study—and the aim of this text—was to present the most effective and most generally applicable plans and devices found among the participating companies for meeting their more common top management problems. The result is a balanced presentation of current management methods that the average corporation can use to check the efficiency of its own operation.

GUIDEBOOK TO THE GEOLOGY OF UTAH, NO. 9. "URANIUM DEPOSITS AND GENERAL GEOLOGY OF SOUTHEASTERN UTAH." Published by Utah Geological Society, 1954. Available at: Utah Geological and Mineralogical Survey, Mines Building, Salt Lake City, Utah. 115 pp., $5.

This book summarizes the geology of southeastern Utah, an area that is increasing in importance because of its uranium possibilities as well as its potential oil and gas reserves. Although the papers stress the uranium occurrences, oil geologists will be interested in the excellent articles on the stratigraphy and structural features of the region.

The guidebook contains 18 illustrations and 5 plates that depict the regional geology of much of southeastern Utah. Itemized road logs will serve as a guide for geologists interested in retracing the route covered by the society's field trip.

WHO'S WHO IN ELECTRONIC DISTRIBUTION, 1954 EDITION. Published by Radio & Electronic Jobber News, Inc., 848 Leader Building, Cleveland 14. 378 pp., $7.50.

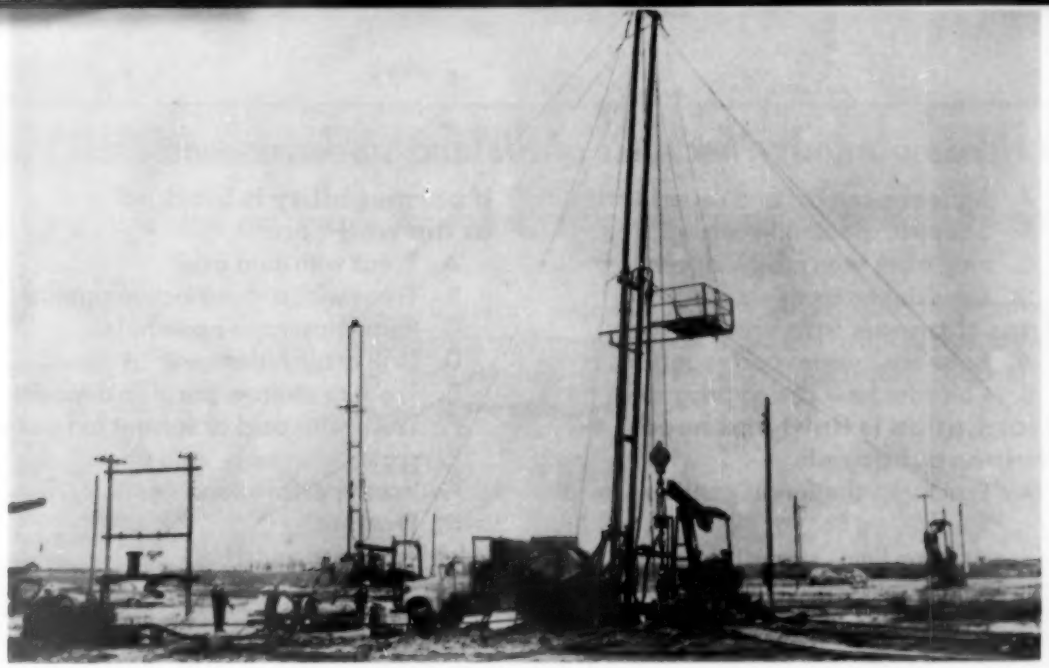
This is a directory of manufacturers, manufacturers' representatives, and distributors in the field of electronic equipment. Indexed by factory, by trade name, and by geographical location, the list covers all major electronic-equipment makers and suppliers and gives pertinent information needed in ordering electronic products.

REPORT OF INVESTIGATIONS NO. 21, GEOLOGY OF HOOD SPRING QUADRANGLE, BREWSTER COUNTY, TEXAS. By R. W. Graves. Published by the Bureau of Economic Geology, University of Texas, University Station, Box 8022, Austin. $2.25.

This report is being printed and will be available soon. This paper is accompanied by a geologic map in color and is further illustrated by four text figures and plates showing various features of the area described. Geologic maps and structure sections of the Maravillas Creek area and of the Tinaja Range area are included.

DRY BRANCH, HARPER, KLEIN BRANCH, AND WENDEL GEOLOGIC QUADRANGLE MAPS OF THE LLANO UPLIFT AREA OF CENTRAL TEXAS. By Virgil E. Barnes. Published by Bureau of Economic Geology, University of Texas, University Station, Box 8022, Austin. 75 cents each.

This is a continuation of the series of 7½-minute geologic quadrangle maps in the Llano uplift area of Texas. These are in color on a scale of 1:31,680 and each has accompanying text. Fourteen similar maps of neighboring areas previously published are still available. In view of the current petroleum activity involving Cambrian rocks, it may be noted that among the 18 geologic quadrangle maps are some showing Cambrian rocks at the surface and texts including descriptions of Cambrian samples from wells.



A South Texas workover job. Workover techniques introduced in the last few years are making the difference between profitable and unprofitable operation in many such fields.

Can Your Wells Produce Their Allowables?

. . . Maybe they are ready for good workovers

by Wallace B. Pardoe

IT is a dangerous practice to have a few good wells on a lease carry the poor ones over too long a time. The day will surely come when these good wells will no longer be capable of carrying the load. Planned workovers involving hydraulic fracturing and other recent techniques can often take the burden off the good wells and distribute it among all the wells on the lease.

Operators of oil and gas properties are not the only ones who have a vital interest in the ability of the properties to produce. The financial institutions which have loans on the property want it to produce at lease enough to supply income necessary to amortize the loan in accordance with terms of their loan agreement.

The banks or insurance companies which make loans on oil property usually provide for minimum monthly payments to guard against unexpected and sudden decline in gross income from the properties. This decline in production can come as a result of artificial restrictions such as more stringent proration. It can also come from the apparent physical impossibility to secure more oil from the wells.

When a situation of this kind occurs and only the minimum payments are being made, the operator finds himself working under a hardship. He may not have sufficient income to properly operate his leases. Furthermore, it is an unhealthy situation from the viewpoint of the people who have made the loan. It is, therefore, in the best interest of everyone concerned that all wells are capable of producing their allowable.

Making estimated production . . . It becomes important to the operator who expects to remain in business and perhaps borrow in the future, that his wells produce at least as much as predicted by the reserve report on which his loan is based. As a rule, reserve estimates are based upon study and projection of production records, along with an examination of the geological and physical characteristics of the properties. Often a comparison is made with production in older and similar areas; but in many cases, these older areas have not had the advantage of new production techniques. Therefore, such an estimate does not ordinarily give value to what the properties might actually be capable of producing if they were subjected to available, proved methods of increasing production and reserves.

Nevertheless, carefully prepared estimates of recovery occupy a definite and fundamental place in the petroleum industry. At their best, they are based on careful interpretation of all available facts; but it is entirely possible for unforeseen conditions to affect the estimates. No properly prepared reserve report intentionally and willfully overestimates the amount of oil that should normally be produced from a particular property. Some reports, to be on the safe side, are deliberately conservative. Even so, such reserve reports are sometimes at variance with the ultimate production because of absolutely unpredictable circumstances.

Recovery today highest ever . . . It is possible, under average conditions today, to secure more oil from a reservoir by primary methods than could be produced in the past. Some years ago, secondary recovery was the principal, and almost the only, method available to secure more oil from the same reservoir. Now, with means of stimu-

Author was petroleum consultant, Tulsa. He died September 29 after a short illness.

Here's a handy check list of ills and workover remedies . . .

- A. Squeeze-cement and reperforate
- B. Squeeze diesel oil—cement mix
- C. Plug back with plastic or cement
- D. Consider new casing program

If gas channels into well

- A. Squeeze-cement and reperforate
- B. Consider new casing program

If formation is tight and needs drainage channels

- A. Fracture, single or multiple treatments
- B. Acidize limes and other calcareous formations
- C. Drill drain holes

If part of reservoir is not open to drainage

- A. Fracture, multiple or deep treatments
- B. Acidize limes and other calcareous formations
- C. Extend perforations

If permeability is blocked at the well bore

- A. Treat with mud acid
- B. Treat with surface-active agents
- C. Ream or scrape open hole
- D. Drill drain holes
- E. Treat to remove paraffin deposits
- F. Treat with acid or solvent to remove scale
- G. Wash perforations
- H. Fracture

If hole contains fill

- A. Reverse circulate
- B. Run sand pump or bailer

If unconsolidated sand is being produced

- A. Run screen or liner
- B. Treat with plastic
- C. Gravel pack
- D. Treat with combination fracture and gravel pack

lating and increasing production by fracturing, new and old production alike can be increased and sustained. This can be done before giving any thought to expensive secondary-recovery operations.

Even though reworking of the wells was not considered at the time of making the reserve report, operators should take advantage of all methods now available in the handling, reworking, and stimulation of their leases. Otherwise, the daily production and the calculated reserves are apt to be lower than anticipated.

Not only is it desirable and good practice, but it is of vital importance to the operator and his lending agency that an analytical field study be made to determine individual well capabilities. The analytical field study should be made both for obtaining maximum daily production and also for establishing ultimate recovery from the lease after full consideration of modern methods of increasing yields. Such procedures will often disclose what may be considered hidden production and reserves.

A producer may have a loan on his property that, after a year or so, does not look so attractive to the bank as when the loan was originally made. However, these same loans may come to be considered excellent risks by the bank after corrective methods have been applied to the properties. Perhaps additional borrowing power for the operator may result.

One point that cannot be over emphasized is the need for individual and regular attention to oil and gas properties by a competent supervisor.

Precautions for fracturing . . . While it is not intended to present here a technical discussion of fracturing processes, it is well to point out that the results obtained often depend on the preliminary preparation of the well before fracturing. The handling of the well during and after the treatment is equally important. Failure to take several necessary precautions may mean failure of the job. These precautions are the function of the operator and not of the service company.

As a preliminary step of prime importance it should be made certain that the well is clean and free from cavings or bottom-hole accumulations. This can be done by using a sand pump. The introduction of mud acid or a similar solvent will do much to clean the face of the formation to be treated, with some penetration, so that the fracturing material will have less resistance going into the formation. Scale and paraffin should also be removed from the conductor string as this material could easily act as a plugging agent.

Fracturing should never be done through casing unless it is known that the casing is in good enough condition to withstand the pressure and that it has been adequately cemented. When treating through the tubing, the annulus should be filled with stock-tank oil and the well head securely closed in. This will obviate any difficulties which could arise in the event of tubing or packer failure. The column of oil is an excellent cushion against the pressure.

Watch sand return . . . Adequate flushing with stock-tank oil is also important to get deeper penetration. With the fracturing, scouring, and propping materials well back into the formation, there is less likelihood of sand returning into the bore hole. The use of two grades of sand has in some cases done much to reduce this trouble. This returning sand not only covers the pay; but in the case of pumping wells, it will cut and score the pump. Therefore, prior to running the pump, it is good practice to go to the bottom of the hole with a sand pump. Any sand that has accumulated can be removed; or in the case of open hole, any sloughing that has occurred as a result of the treatment can be taken out.

Thorough Maintenance, Periodic Testing . . .

. . . These are musts for valves, valve operators, and shutdown systems

by Paul L. Hughen

Texas Eastern's experience with power-operated valves and emergency shutdown systems indicates proper, positive operation can be had only with good inspection and complete testing of the equipment.

THE policy of operating plants and equipment with a minimum of personnel, or in some cases with no personnel in attendance, has made it necessary for Texas Eastern Gas Transmission Corp. to install a number of powered valve operators on key valves which control flow through such installations.

In such powered-valve installations, particularly in emergency shutdown systems which may not be required to operate for long periods of time, we have found it very necessary to make periodic tests of the equipment and to run it through its full cycle of operation whenever piping or operational considerations will permit. Only in this manner is there assurance that the equipment will function properly during a period of actual emergency.

Time and manpower required to operate by hand a valve requiring over 600 turns of the hand wheel, as is the case on some 30-in. gate valves, emphasizes the necessity of power operators. Also, regulatory bodies in some states require emergency shutdown systems on compressor stations falling in certain categories.

The necessity for power operators on key valves in large, high-pressure, and efficient pipeline systems is no longer a debatable question, but the design engineers have food for thought in selecting the most efficient and economical operator for a given job.

Power-operated valves . . . The operators which will be discussed here function on scraper-trap valves, main-line block valves, station suction valves, station discharge valves, station bypass valves, and station blowdown valves. Other valve operators in the compressor station proper will be excluded from this article. Table 1 shows a tabulation of valves and valve operators discussed in this article.

Some of the 24-in. scraper-trap valves installed on our original system, as taken over in 1947, were equipped with electric - driven limitorque operators. Since scraper-trap valves do not restrict or control the main gas stream and since we are at liberty to operate, test, and maintain these operators at will, no problem of major significance has been encountered with this type operator.

Low-Pressure Shutdown System

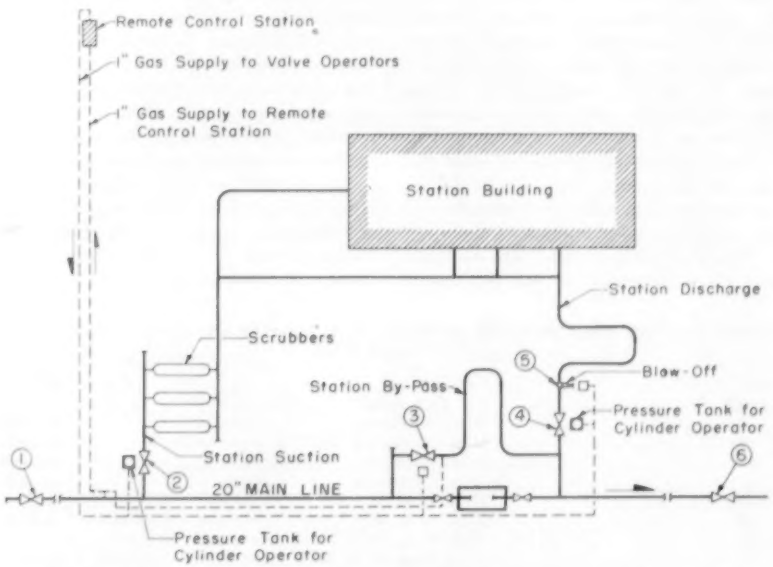
The emergency shutdown system installed at our first group of single-line stations was equipped to close the station suction and the station discharge valve and to open the station blowoff valve by operating one valve located at a remote point from the station. The station bypass-valve operator is not activated from the remote-control point. The power gas supply line is pressured up to a control valve adjacent to the operator from the remote point but the operator must be activated manually.

TABLE 1 — TABULATION OF VALVES AND VALVE OPERATORS

No. of valves	Type operator	Power supply
189	E. I. M.	Gas
2	E. I. M.	Electric
199	Limitorque	Gas
32	Limitorque	Electric
62	Cylinder	Gas
47	Shafer	Gas

Fig. 1 outlines the flow diagram of this typical single-line remote control system and tabulates valves, valve operators, and major items of equipment composing the system. Valves 2, 4, and 5, as shown in Fig. 1, are operated from remote locations. At reciprocating stations only, this system includes a gas supply line connected to a mercury switch so that the compressor units are knocked off when the emergency system is activated.

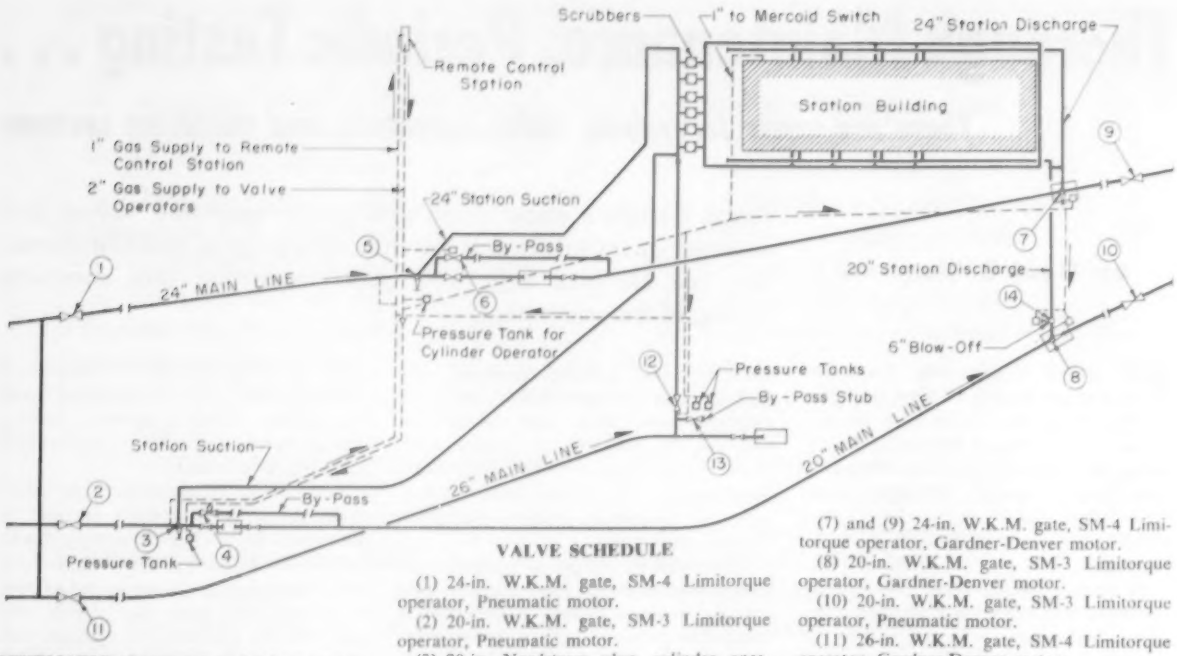
The compressor units at centrifugal stations must be shut down by a sepa-



LOW-PRESSURE emergency shutdown system as installed on single-line station. Fig. 1.

VALVE SCHEDULE

(1) 20-in. W.K.M. gate, SM-3 Limitorque operator, Gardner-Denver motor.
(2) 20-in. Nordstrom plug, cylinder operator.
(3) 12 by 18-in. W.K.M. gate, SM-2 Limitorque operator, Keller motor.
(4) 20-in. Nordstrom plug, cylinder operator.
(5) 6 by 4-in. W.K.M. gate, SM-1 Limitorque operator, Keller motor.
(6) 20-in. W.K.M. gate, SM-3 Limitorque operator, Gardner-Denver motor.



SCHEMATIC of emergency shutdown system used at multiple-line stations. Fig. 2.

VALVE SCHEDULE

(1) 24-in. W.K.M. gate, SM-4 Limitorque operator, Pneumatic motor.
(2) 20-in. W.K.M. gate, SM-3 Limitorque operator, Pneumatic motor.
(3) 20-in. Nordstrom plug, cylinder operator.
(4) 18 by 12-in. W.K.M. gate, SM-2 Limitorque operator, Keller motor.
(5) 24-in. Walworth plug, cylinder operator.
(6) 18 by 12-in. W.K.M. gate, SM-2 Limitorque operator, Keller motor.
(7) and (9) 24-in. W.K.M. gate, SM-4 Limitorque operator, Gardner-Denver motor.
(8) 20-in. W.K.M. gate, SM-3 Limitorque operator, Gardner-Denver motor.
(10) 20-in. W.K.M. gate, SM-3 Limitorque operator, Pneumatic motor.
(11) 26-in. W.K.M. gate, SM-4 Limitorque operator, Gardner-Denver motor.
(12) 24-in. Nordstrom plug, cylinder operator.
(13) 24-in. Nordstrom plug, cylinder operator.
(14) 6-in. W.K.M. gate, SM-1 Limitorque operator, Keller motor.

rate operation since no connection exists between the emergency shutdown system and the unit drivers.

The multiple-line emergency shutdown system operates essentially the same as the single-station system; therefore our comments will apply to either or both systems. Fig. 2 outlines a multiple-line system and tabulates valves, valve operators, and major items of equipment used therein. Activation of the system operates valves Nos. 3, 5, 12, 7, 8, and 14. Fig. 3 shows details of the remote-control stand used with the low-pressure systems. Valve No. 1 of Fig. 3 is the control point of this system.

Shutdown time . . . The low-pressure systems described under this heading operate at 250-psi. pressure. Since each system is composed of operators of different types, the time required to operate individual valves varies considerably. The cylinder-operated valves usually close in from 4 to 10 seconds while the valves operated by gas-motor-driven operators usually operate in from 2 to 4 minutes.

Tables 2 and 3 show times required to operate individual valves and individual systems. Since the volume of gas to be exhausted from the system is different at each station, we will not discuss the time required to exhaust the system to atmospheric pressure.

In-service testing . . . Early experience in operating and maintaining these systems indicated that it would be necessary to have trained personnel to conduct scheduled inspections and test on the valves, operators, regulators, and other components of the system in order to assure positive performance. Therefore, a valve-control inspector is assigned to each division of the company with the primary responsibility of inspecting, testing, and performing maintenance on equipment installed in this system and the equipment covered under the discussion which will follow on high-pressure emergency systems and on main-line valve operators.

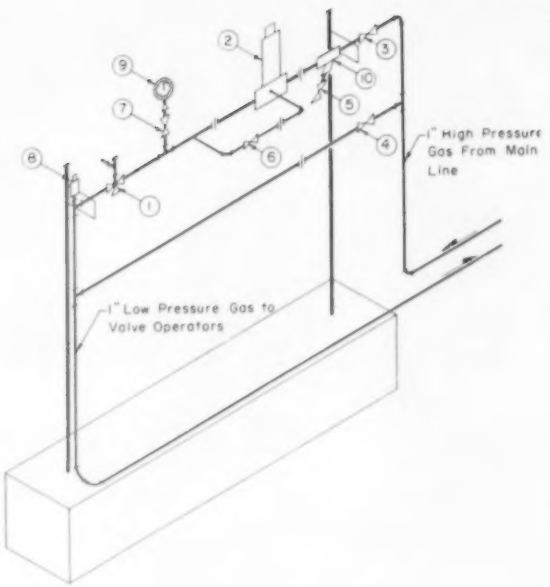
The emergency systems are operated when it is necessary to shut the station down. However, our experience indicates that we cannot wait for a shutdown that will occur through the normal course of events if we are to be assured that all components of the system will function properly. It is possible to partially check the suction and discharge valves by manually operating the valves part way without seriously restricting flow through the system. A method of testing the station blowdown valve without actually exhausting gas from the system is being used in order to eliminate station down time. A flange or hub for a standard blanking device is constructed on the blowoff

TABLE 2—TIME REQUIRED TO OPERATE KEY VALVES IN EMERGENCY SHUTDOWN SYSTEMS

No. tested	Type valve	Type operators	Average time to operate
4	26-in. Nordstrom	Cylinder	5 seconds
3	24-in. Nordstrom	Cylinder	7 seconds
19	24-in. Walworth	Cylinder	11 seconds
25	20-in. Nordstrom	Cylinder	8 seconds
3	24-in. W. K. M.	Limitorque	4 minutes, 36 seconds
4	20-in. W. K. M.	Limitorque	3 minutes, 33 seconds
11	18-in. W. K. M.	Limitorque	3 minutes, 8 seconds
33	18 by 12-in. W. K. M.	Limitorque	1 minute, 47 seconds
10	16-in. W. K. M.	Limitorque	2 minutes, 45 seconds
7	6-in. W. K. M.	Limitorque	46 seconds
27	6 by 4-in. W. K. M.	Limitorque	36 seconds

TABLE 3—AVERAGE TIME REQUIRED FOR EMERGENCY SYSTEM TO FUNCTION

No. of stations tested	Type system	Average time required for system to function
11	Low-pressure-single-line station	1 minute, 46 seconds
13	Low-pressure-double-line station	4 minutes, 23 seconds



EQUIPMENT SCHEDULE

(1) 1-in., three-way plug valve.
(2) and (4) 1-in. pressure-reducing valve, 650/250 psi. reduction.
(3) 1-in. valve.
(5), (6) and (7) ¼ to ½-in. valve.
(8) Relief valve set at 300 psi.
(9) Pressure gage, 0 to 300 psi. scale.
(10) 1-in. "Y" sediment separator.

DETAILS of control point which is used to activate the low-pressure shutdown system. Fig. 3.

stack so the valve-control inspector can, by installing a blind flange or blanking plug on the stack, operate and test the blowoff valve and operator with no interference to normal operation. After operating and testing the valve and operator, the blind flange or blanking plug is removed, leaving the system ready for emergency operation.

By testing and partially operating the suction and discharge valves and operators, except cylinder type, and completely checking the station blowdown valve and operator, we have done all that can be done without a station shutdown. Testing of the station bypass valve and operator and, in the case of reciprocating stations, unit tripping segment of the system and operating the suction and discharge valves and operators through their cycle would complete a full checkout of the system.

The radial-type motors used were designed for nonlubrication but we have found that by applying a small amount of lubrication, obtained by installing a variable-type lubricator, we can expect less trouble from freezing or galling between the distributor and distributor housing.

Our experience from recent tests indicate that at least a semiannual scheduled test with a full station shutdown will be required to assure proper operation and maintenance of this system.

High-Pressure Shutdown System

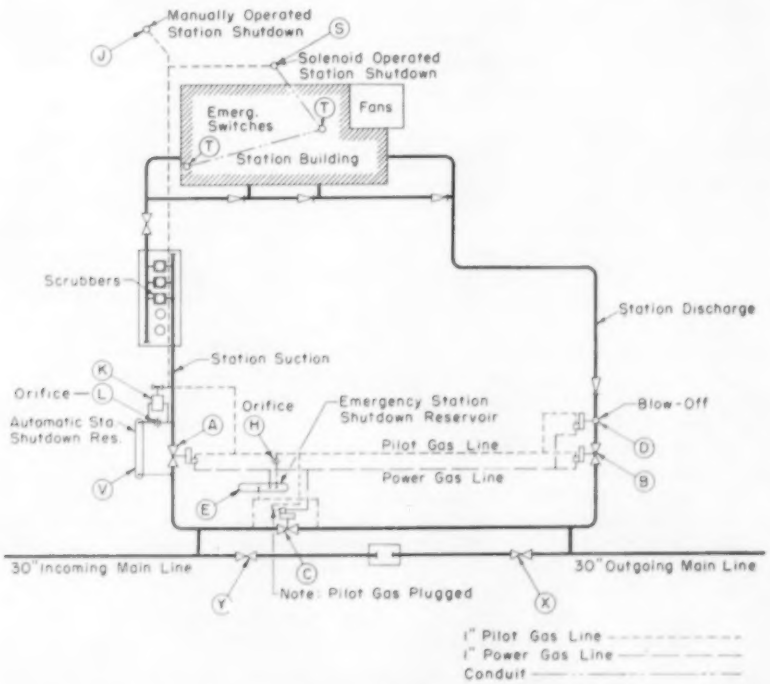
This system, as outlined in Fig. 4, operates at line pressure and is equipped to close the station suction valve A, close the station discharge valve B, open the station blowdown valve D, and shut off prime movers. These actions are initiated when a differential pressure is created across orifice H by the activation of one of the control points on the pilot line or when a predetermined differential pressure occurs across the orifice installed in the automatic portion of this system.

The automatic feature of the system is designed so that any abnormal development in the major gas piping will cause automatic blowdown of the pilot line, thus activating the emergency system. The pilot line will blow down when a predetermined differential pressure, usually 35 psi., exists across the orifice L which is installed between the reservoir V and the blowdown valve. Normal fluctuation of pressure will not actuate the system.

The station bypass valve C is not operated by the emergency system but has power gas against a control valve located on operator which must be manually activated. One important difference between the high-pressure and the low-pressure system is that in the former, both the pilot and power-gas piping is at station discharge pressure at all times while in a low-pressure system no pressure is on the power gas line until the system is activated.

Shafer operators are installed on valves A, B, C, and D, as shown by Fig. 4. Also tabulated are items of equipment used in the system. This equipment list, since we are not going into design of the system or equipment, will be of interest to those interested in checking further into details of the equipment.

The necessity of testing, operating, and maintaining this system is equally as urgent as the other systems discussed. We can completely check the station



HIGH-PRESSURE shutdown system in which pilot and power gas lines operate at station discharge pressure at all times. Fig. 4.

VALVE SCHEDULE

(A), (B), and (C) 30 by 24-in. Nordstrom plug, Shafer operator.
(D) 6-in. Nordstrom plug, Shafer operator.
(X) and (Y) 30-in. W.K.M. gate, E.I.M. operator.

blowdown valve and operator by temporarily capping the stack installed on the valve and operating the valve and operator through its full cycle. We can individually operate the suction and discharge valves and operators through part of their cycle without greatly restricting the gas stream but to check out the prime-mover shutdown feature and the functioning of the control points of the system, a complete station shutdown is necessary.

Since the time required to operate individual valves installed on this type system and time to operate individual systems as developed by recent test are so near constant, we have not tabulated these times. It is to be noted that the high-pressure, newer systems work much faster than low-pressure, older systems. The time required to operate individual valves varied from 4 seconds to 6 seconds. The average time to operate the high-pressure system is 6 seconds.

Little trouble has been encountered in maintaining these high-pressure operators. The nylon seats installed in the poppet valves are subject to being damaged by foreign particles and must be replaced in order to prevent leakage sufficient to actuate the valve.

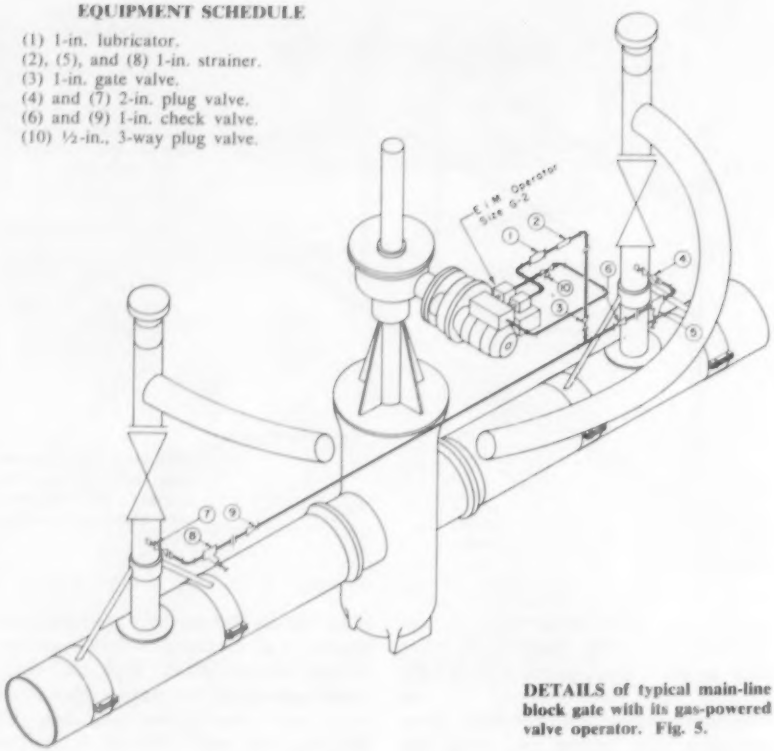
Main-Line Valve Operators

The newest type of main-line block-gate operator which is installed on our system is shown in Fig. 5. It has been piped to eliminate many of the problems encountered with earlier systems.

Testing and maintaining these operators are greatly simplified if a by-pass is installed around the gate valve so that the inspectors can operate the valve through its full cycle without greatly restricting the flow of gas through the line. In checking the original operators on our system, it was believed that a partial operation of the valve and operator would be sufficient to determine the condition of the valve and operator. However, partially closing a valve, say 6 to 12 in., will fail to show presence of ice or other foreign matter in the bottom of the valve.

EQUIPMENT SCHEDULE

(1) 1-in. lubricator.
(2), (5), and (8) 1-in. strainer.
(3) 1-in. gate valve.
(4) and (7) 2-in. plug valve.
(6) and (9) 1-in. check valve.
(10) ½-in., 3-way plug valve.



DETAILS of typical main-line block gate with its gas-powered valve operator. Fig. 5.

Most of our main-line valve installations are through-conduit, gas-power-operated valves. The installation includes the valve, valve gear box, operator, motor, and necessary controls and piping for opening or closing. Table 4 shows tabulation of times required to operate several sizes of block gates installed on our system. The times tabulated are average times and include older installations as well as newer and faster operators. All newer installations can be adjusted for speed.

Orifice reduces motor wear . . . The motors used are of two types, a five-cylinder radial and single-stage turbine. The vanes of the turbine motor wear excessively only at high speed. When the vanes become worn, they slide out of their normal position and are caught in the cam housing; therefore, the motor becomes inoperative, making the valves completely inoperative until the motor is removed. Then it may be operated by use of the hand wheel.

Wear on the vanes was corrected by installing a variable orifice in the supply line. By using a variable orifice, the valves and operator could be checked at reduced speed without doing any damage, yet in an emergency the orifice could be opened to give maximum performance.

Corrosion from moisture in selector valves and limit valves, resulting from both rain and condensation, caused somewhat of a problem in operating and maintaining both turbine and five-cylinder radial-type motors. Through the use of gaskets and sealing compounds, the outside moisture was stopped. By increasing the amount of lubrication through the use of a variable-type lubricator, corrosion from condensation was minimized.

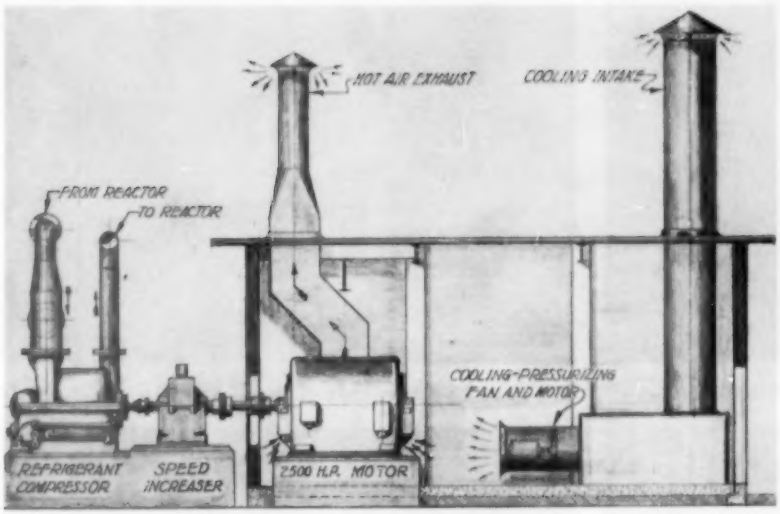
Operating the valve through less than the full cycle does not prove the valve and operator are in satisfactory condition. Our valve-control inspectors are instructed to operate through the complete cycle the valves that can be operated without seriously restricting main-line flow. This procedure is enabling us to eliminate bugs from the system which were not found during routine inspections previously.

TABLE 4—AVERAGE TIME REQUIRED FOR MAIN-LINE VALVES TO FUNCTION

Type and size valve—	Type operator	Average closing time	Average opening time
30-in. W. K. M.	E. I. M.	115 seconds	111 seconds
24-in. W. K. M.	E. I. M.	98 seconds	99 seconds
20-in. W. K. M.	E. I. M.	57 seconds	57 seconds
16-in. W. K. M.	E. I. M.	66 seconds	60 seconds

THE AUTHOR

Paul L. Hughen is pipeline superintendent for Texas Eastern Transmission Corp., Shreveport. He has been engaged in the natural-gas and natural-gas-pipeline industries almost continuously since he was graduated with a degree in civil engineering from Louisiana Polytechnic Institute in 1937. Prior to his employment by Texas Eastern, he worked as engineer for Southwest Natural Gas Co. and for United Gas Pipe Line Co. He joined Texas Eastern as engineering inspector in 1947.



Refrigeration equipment was installed in ventilated building at Eastern States refinery.

REFINING POINTER

Nonexplosionproof Motor Made Safe in Hazardous Area

by H. M. Martin, Jr.

INSTALLATION of a motor-driven centrifugal refrigeration blower in a new sulfuric acid alkylation unit at the Eastern States refinery in Houston features a new design in large motor installations. This consists of a nonexplosionproof type, 2,500-hp. motor housed in a ventilated building.

During the initial stages of design on this unit, process calculations indicated that a centrifugal blower with a requirement of 2,350 b.h.p. would be needed in the refrigeration section of the unit. Originally the engineering department proposed to use a steam-turbine drive on the refrigeration unit and two systems of turbine drive were investigated.

One was a high-pressure turbine drive with the exhaust of the turbine feeding into the main steam header of the plant. The other was a turbine drive to be powered off the plant main steam header with the unit exhausting to a new vacuum condensing system. Both of these systems proved unattractive due to the high estimated costs for the installation of either the high-pressure boiler or the large vacuum system with its separate source of water supply.

Author is chief engineer, Eastern States Petroleum Co., Houston.

Electric drive . . . Economically, an electric drive for the blower then seemed to be the logical choice. A motor had not been considered originally as the blower was to be located in a hazardous area and explosionproof motors in the range of 2,500 hp. are not common items of manufacture. A quick check of motor manufacturers made clear that so large an explosionproof motor could not be built and delivered in time to meet the scheduled completion of the new unit.

The plant engineering department decided to install a conventional-type electric motor for the blower drive and planned to mount the motor in such a manner as to make its operation safe in the hazardous area. The refrigeration blower had to be located close to the unit as the allowable pressure drop in the blower suction line was very small.

Building erected . . . The motor, speed increaser, and blower were mounted on a concrete foundation. Then a masonry building was erected over the motor. The shaft of the motor passed through a hole in a steel plate in the wall of the building where it was coupled to the speed increaser. The clearance between this plate and the shaft was approximately ⅛-in. All of the nonexplosionproof switchgear for the motor was also installed in the building.

Installation . . . A low-pressure, high-volume radial fan was also installed in the building. This fan was powered by an explosionproof motor and the suction of the fan was connected to a duct which ran through the roof of the building and upward to a point where the air supply would be sure to be free of hydrocarbon gases.

With the doors of the building closed and with the large blower motor not running this fan maintains a positive pressure of 1½ in. of water in the building. The large motor is provided with a case that has a cooling-air opening at the bottom and an air vent at the top. This cooling-air exhaust opening was connected to another duct that passes through the roof of the building. When the large motor is running its cooling air is drawn from the pressurized room and vented out through the exhaust duct off the motor to the atmosphere. This arrangement is shown in Fig. 1.

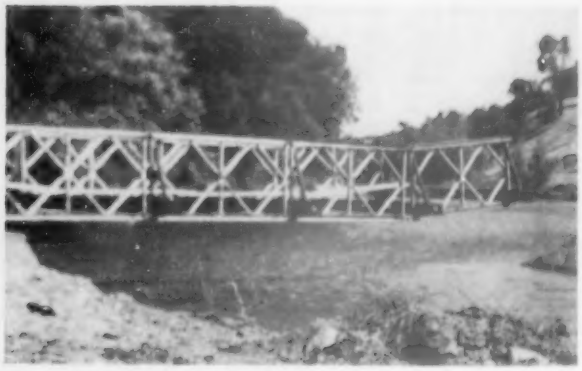
When the large motor is running the pressure in the room drops to ½ in. of water. Should one of the outside doors to the room be left open the pressure of the room will not drop below about ¼ in. of water. In case of a failure of the pressurizing blower, the large motor can draw sufficient cooling air through the stopped blower's case and its duct.

Operating procedure . . . This is as follows: Startup: The power circuit for the large motor and the smaller explosionproof power circuit which supplies the pressurizing blower are both killed. The doors of the room are closed and the explosionproof circuit is activated. The pressurizing blower is then started. Pressure is built up in the room in a matter of seconds but the blower is allowed to run for several minutes while the air in the room is checked with an explosimeter. If the air in the room is gas free, the large circuit is activated and the refrigerating blower drive motor is started. Stopping: First the large motor is stopped and then the large circuit is killed. Then the pressurizing fan is stopped and the doors of the building are opened.

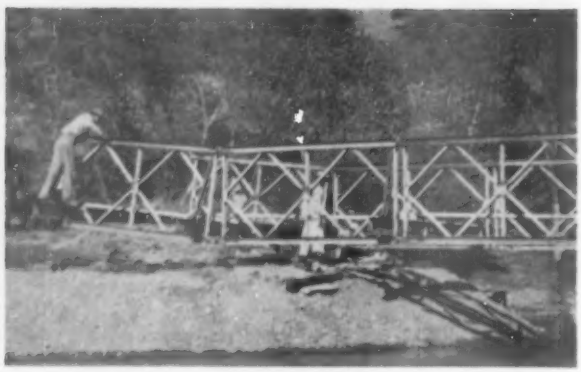
The operators have had no difficulty with these simple procedures and the special arrangement has been a complete success. The operating personnel are satisfied with the equipment and the company's management is pleased with the lower capital investment and short construction time brought about by this arrangement.

1. **Materials ready . . .**

2. **. . . . to span this site . . .**



5. **. . . two more in place . . .**



6. **. . . final span in place . . .**

Here's what happened when Shell engineers set about . . .

Building a Bridge—in 150 Man-Hours!

by C. F. Hamlin

WHEN Shell Oil Co. decided to drill a wildcat in an isolated location in the Rumsey Hills northwest of Sacramento, the first problem was to get a temporary bridge across Cache Creek over which the drill rigs could be driven. The stream was about 80 ft. wide and velocity was high. Construction of a conventional timber pile trestle would have been expensive and difficult. Furthermore, it would be a costly operation to remove the structure after drilling.

Since stream conditions demanded a long, clear span, it was decided to obtain a bridge with an 80-ft. clear span. Accordingly, an agreement was made with Bailey Bridge Equipment Co., of San Luis Obispo, covering rental of an 80-ft. "double single" span and the special erection gear needed.

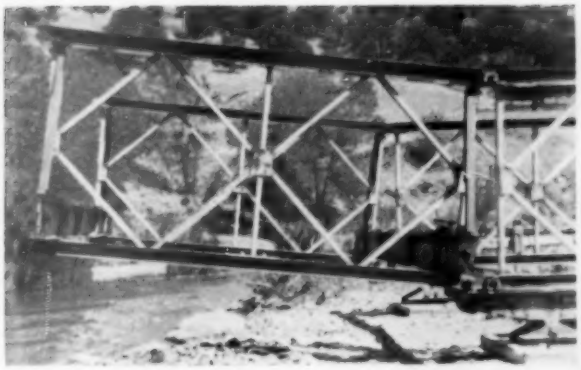
Author is civil engineer with Bailey Bridge Equipment Co., San Luis Obispo, Calif.

The materials arrived on two trucks on a Friday morning and were unloaded just before noon. Erection rollers were then positioned, timber bearing pads placed, and assembly of the bridge was started. Erection by the cantilever launching method, developed and in common use during the war, was selected because it was the quickest method and because it required no falsework in the stream.

First, a lightweight launching nose 40-ft. long was assembled from the 10-ft. panels and placed on top of the rollers. Next, the bridge itself was added in 10-ft. bays complete with floorbeams stringers, deck, and curb. As additional bays were completed, the entire structure, headed by the 40-ft. nose, was rolled out over the stream, care being taken to keep the balance point well behind the rollers on the edge of the bank. After the nose reached the far bank and had landed upon the rollers there, balance was no longer a problem and the bridge was completed at the rear while the panels in the nose were being dismantled.

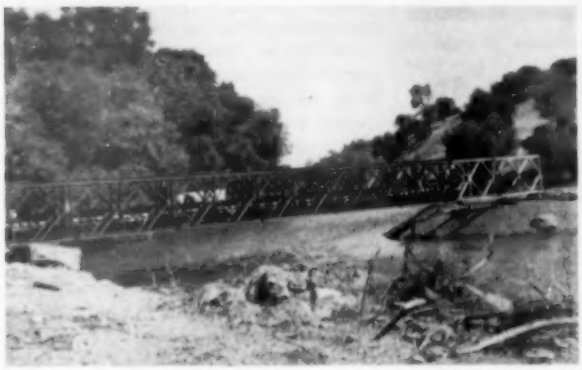
Final operation was to jack up the span, remove the rollers, and set it down with its steel bearings resting on the timber mats. This done, 10-ft. ramp spans were attached to the ends, a bulldozer smoothed up the approaches, and the bridge was ready to use. It had taken the nine-man crew, aided by a small tractor and a light crawler crane, from Friday noon to Sunday noon, or about 170 man-hours, to erect the structure.

Although the complete 80-ft. span weighs more than 24 tons, the heaviest single member in the structure weighs less than 600 lb. The safe-capacity rating is over 50 tons per single vehicle, which is ample.

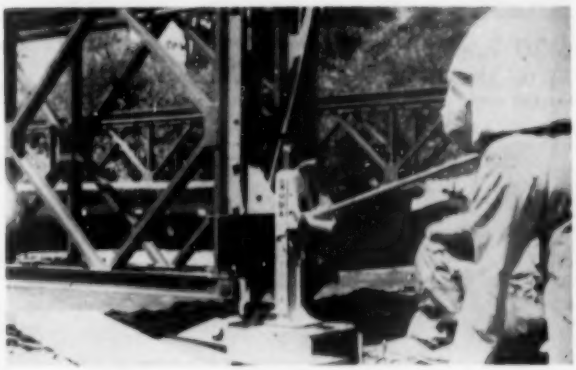


3. . . . taking off from near bank . . .

4. . . . second span is added . . .



7. . . . all steel in place . . .



8. . . . set down on mats . . .

9. . . . stringers are laid . . .

10. . . . the flooring is added . . .

11. . . . 150 man-hours later . . .

12. . . . first truck goes across.

6:30 a.m. **Spencer's engineering-purchasing-construction management team prepares to leave Fairfax Airport in Kansas City, the firm's headquarters. Left to right are: Don Gibson, pilot; B. M. Kern, chief engineer; J. C. Denton, general manager of engineering and construction; and L. D. Jones, director of purchasing.**

11:30 a.m. **An on-the-site conference begins at Orange, Tex., to check progress. Supplemented by Orange construction managers, the full group includes (left to right): J. F. Hodge, president, Quaker Valley Constructors, Inc. (Spencer subsidiary); M. Holmes, project manager at Orange; J. C. Denton, B. M. Kern; and L. D. Jones.**

Spencer Moves Fast, Preplans to Speed Plant Construction

by F. Lawrence Resen
Gulf Coast District Editor

PLANNING—of location, of engineering, of purchasing, and of construction—lies behind the Spencer Chemical Co. polyethylene plant currently under construction at Orange, Tex.

This plant, which will use the I.C.I. high-pressure polymerization process to produce about 150,000 lb. of ethylene per day, is being built by Quaker Valley Constructors, Inc., wholly owned Spencer subsidiary, and behind this is the story of how the two companies have operated in building the facilities.

To understand the workings of the planning groups involved, it is first necessary to study the organizational setup used. Spencer Chemical established an industrial services group to handle all construction programs, headed by J. C. Denton, general manager of engineering construction, who reports to C. Y. Thomas, vice president in charge of operations.

A three-way split is next made, with B. M. Kern, chief engineer responsible for his department and supplementary work done by Wyatt C. Hedrick Engineering Corp.; L. D. Jones, director of purchasing, is concerned with the procuring of needed equipment and materials; and J. F. Hodge, president and general manager of Quaker Valley, and M. Holmes, project manager, handle the actual construction.

The core of the planning group is made up of Denton, Kern, Jones, and Hodge, with other personnel naturally brought into the discussions. However, by setting up this group on the departmental-head level, and having them meet on the project site as required (about every 2 to 3 weeks), the necessary decisions may be made and acted upon on the spot, saving unnecessary communicative delays. At the same time, responsibilities for various aspects of the work may be pin pointed at these meetings, thus clearing up confusion which frequently may develop in construction jobs. Incidentally, the planning group is not only responsible for the Orange job, but for several others under way and it handles these in a similar manner.

Choosing the Plant Location

Initially, the search was for a location which would fulfill the various plant physical needs: raw materials, water, transportation, and labor. This wasn't too difficult a task, with Gulf Oil Corp. producing ethylene at its nearby Port Arthur plant and transporting it to Orange via pipeline. Natural gas is also available for power purposes from nearby Gulf Coast fields. Water is in plentiful supply both from the Sabine River and interconnecting canals and from underground sands.

Transportation facilities were available from railroads as well as water via intracoastal canal, or deep-water vessels able to navigate the Sabine River. Lastly, a supply of experienced labor exists in the Gulf Coast regions.

With the plant location settled upon, the planning group concentrated on the actual problems relating to construction of the plant, breaking them down into three main categories: (1) Enginering, (2) procurement, and (3) construction. The immediate emphasis was placed on engineering in obtaining specifications and drawings, then as their work progressed, the procurement of equipment and materials came into prominence. Currently pushing towards an onstream date in the early spring, the planning group find

the emphasis now shifting from engineering and purchasing towards construction.

To assist them in their thinking and actions, the group set up four master control outlines which included all phases of the construction. The four outlines were: (1) Engineering equipment schedule, (2) drawing status report, (3) purchasing schedule, and (4) over-all tentative planning schedule. These outlines were made in sheet form and in covering all of the items necessary required between 250 and 300 pages for each of the four classifications. These sheets were kept up to date, revised at each meeting, and then recirculated through the interested departments. As will be seen in the discussion of their function, some overlapping occurred in them due to the natural fact that all parts of the job were interrelated.

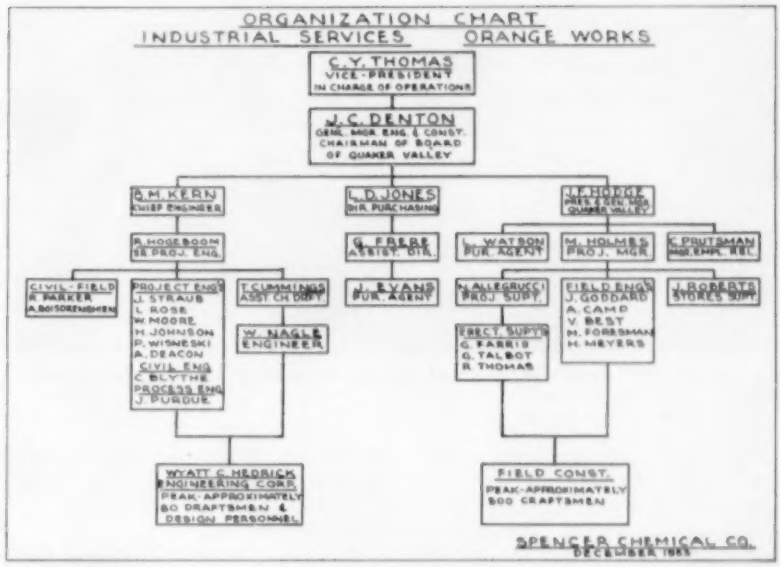
Functions of Scheduling Sheets

The engineering equipment schedule sheet is broken down into various columns: subcode number, flow-sheet item number, description and drawing, specifications, and order-date listings. To illustrate how it was used, a sample sheet from Section 400-Purification will be followed through. The subcode number of .74 indicated it was a heat exchanger, it was listed as flow-sheet item E-1, and was described as the ethylene feed-product exchanger, quantity being one.

The preliminary specification and drawing was available on 10/26/53, with it being requisitioned by engineering the same day. Quite significantly, all dates used on these sheets refer to the date they reach the individual who will act upon them. Thus, the purchasing department, using this sheet obtained quotations on the item and gave them to the engineering department on 12/15/53. The decision on which particular manufacturer's item to buy was finally made on 1/1/54, with the final specifications being checked the same day and the final purchase order issued by purchasing that day. Vendor's drawings on the item were obtained on 2/1/54 and approved on 2/15/54. This last item then closed out the particular exchanger on the engineering-equipment schedule.

The running account of progress being made was constantly being checked with the purchasing department during this period to provide it with information, and to assure that the purchase orders were being issued and that no items would be overlooked. This schedule was used primarily by the engineering department in its functioning.

A second sheet, also used by the engineering department, was to indicate the status of various drawings. This listed all necessary drawings, when they were begun and when completed, approved, and issued. Actually, this tied in very closely with the engineering equipment schedule for many of the drawings had to await vendor's drawings before they could be completed. By having this list available, and re-



BY ORGANIZING this special industrial services division, Spencer simplified delegation of responsibility and speeded up communications.

FOUR MASTER CONTROL OUTLINES greatly assist planning and purchasing. From top down, the outlines here are: engineering equipment schedule; drawing status report; purchasing schedule; and over-all tentative planning schedule.

THE PLANT SITE covers 400 acres and has highway, railroad, and barge transportation frontages.

vising it daily, the engineering department could determine quickly the progress being made on various facets of the drafting program. The currently revised list was used in each planning group meeting in guiding its moves.

The purchasing department drew up a master sheet as a means of maintaining an accurate check on equipment procurement. This sheet overlapped somewhat with the two previous ones in that it was concerned with the requisitions and the drawings as well as the delivery schedules. Again following the E-1 ethylene feed product exchanger through the sheet, we find its quantity listed first, then the description, and next the date the requisition was received, 10/29/53. The particular requisition code number is also included. Once the decision has been made on the basis of quotations received, the purchase order, number, and cost are listed on the sheet, along with the supplier's address and shipping point. In this case, the exchanger was ordered through Brown Fintube Co., Tulsa, to be shipped from Batavia, N. Y.

The drawing schedule is concerned with the preliminary equipment prints to be furnished by the vendor, and then the final certified prints due on the operation. This schedule overlaps with the two previous ones as already noted, and maintains the continuity of thought between purchasing and engineering departments.

Estimating Equipment Delivery

The final use of the sheets is to gain an estimate of when various pieces of equipment may be received. The sheet is marked off by vertical lines according to months and the estimated delivery dates marked in. The estimated and purchase delivery order dates are normally at odds, due to the fact that most purchase-order promises will allow some additional time for manufacturing contingencies. However, a combination of letters, telegrams, phone calls, and personal visits is used to help expedite equipment movement and to get a more accurate estimate of equipment manufacturers schedules.

Naturally, the situation varies with each individual piece of equipment, but frequently the actual delivery date is earlier than promised. However, to give the construction group a more accurate picture of the situation, the shipping date—vendor's delivery date—is plotted on the monthly grid, and then an allowance for shipping time to the actual plant site made. This allowance is quite significant, for a considerable number of days may elapse before a piece of equipment reaches Orange, Tex., from eastern cities, such as Batavia. Thus, by checking this sheet, the purchasing department can determine at a glance how many followup calls have been made regarding a specific piece of equipment, whether the delivery schedule is lagging, and when the plant constructors may expect to receive the item.

Master Scheduling Sheet Functions

The final sheet used by the planning group is the master tentative planning schedule. The plant is broken down into various portions, such as boilers, maintenance building and warehouse, cooling tower, etc., and a master sheet used to plot the progress of the engineering, purchasing, and construction. Vertical lines are used to divide the sheet into months, and horizontal double lines used to divide the particular operation into its component parts. As an example, on maintenance building, warehouse, and material-storage-yard master sheet, the horizontal breakdown includes such items as excavation, masonry, structure, electrical, cast-iron lines, steel lines, and painting.

In each of the breakdowns, three horizontal lines divide the sheet so that the engineering, procurement, and construction activities may then be plotted. The individual group's progress is marked in, with the initial date activity began inserted in the appropriate monthly column, and then the plot line extended until the final work has been accomplished. Letters designating requisition (R), purchasing quotations (Q), purchasing (P), and delivery of vendor's prints (V), are inserted in the appropriate line plot as additional progress indicators.

Following through the progress made on the structure as plotted on the master sheet, the initial consideration date was plotted in the middle of July 1953. Engineering work was required until the middle of December, and the line was terminated at this point indicating the last print had reached the plant site by then. The "R" for requisition was plotted in at mid-August, and the "V" for vendor's prints plotted in at mid-November.

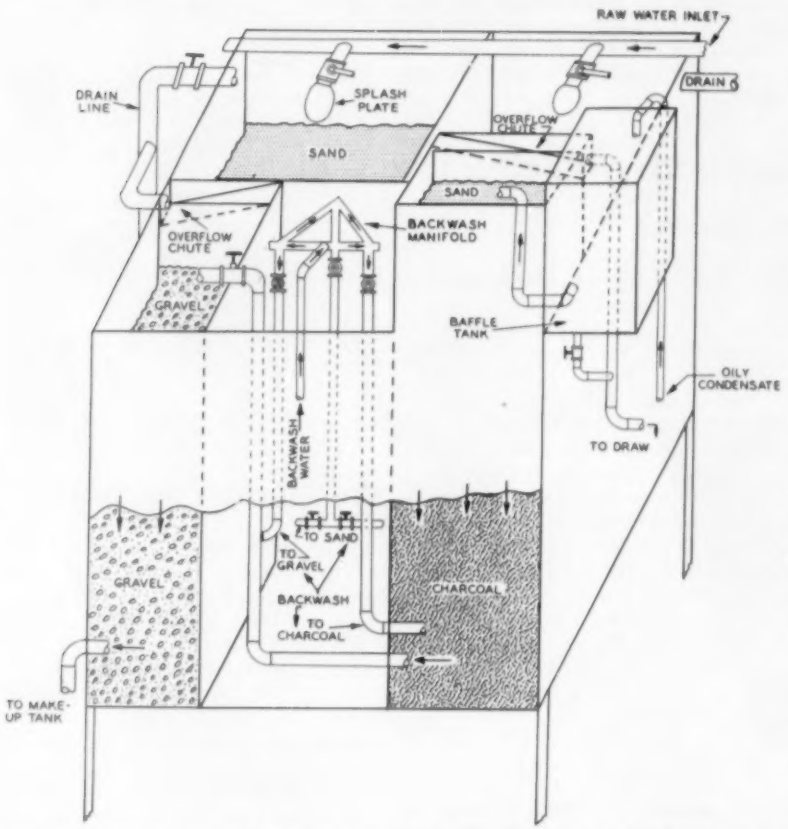
Meanwhile, on the purchasing line, its initial activity began in mid-August and was so plotted with "Q", quotations, and "P", purchase orders, filled in during September. The terminal of the purchasing plot indicated the date the last item relating to the structure was to reach the plant site.

Construction Personnel Control

Last of the items plotted on the master sheet was the construction schedule, from its beginning to completion date. Normally, this began following the receipt of all material and equipment, although on a major part of the project, the purchasing department sheet would be used to determine what items would be available early and make it possible to complete a portion of something as big as the compressor building, then turn to other jobs intermittently.

A fifth sheet was actually put into use by the construction group to determine how the available crafts and personnel should be distributed as equipment arrived at the plant. If the compressors were due at a certain date, it meant that emphasis should be placed on getting the foundations poured so to be ready to place them on their respective blocks as they arrived. Again, this juggling of personnel could be anticipated as a result of the planning group's regular meeting where revised sheets showing the latest progress to date were available.

These control sheets and the planning setup were the outgrowth of previous jobs done by the same group. Similar planning had been done on other jobs, and the present setup represents the accumulation of the best of the other systems as used on actual construction jobs.



BY COMBINING two separate filters into one unit, raw water and oily condensate can be filtered simultaneously. Sunray employes designed and built the unit.

Special filter does two jobs

by F. Lawrence Resen

A COMBINATION filter unit is being used at Sunray Oil Corp.'s Benton, La., cycling plant for handling both raw water and oily condensate.

The unit, actually two separate filters, filters raw water through a sand box, while oily condensate passes through a two-stage, charcoal-and-gravel system.

The filters were devised by Sunray employes and are complete with necessary backwash arrangements.

The entire unit is made from steel plate and is box-shaped, with necessary compartmentation. It is supported in an elevated position, permitting gravity flow to water makeup tanks and drains. Let's look first at the raw water, then the oily condensate section.

Sand box . . . Raw water at the plant is obtained from springs and contains a considerable amount of algae. Hence, it was desirable to sand filter it before using it for makeup water.

Approximately half of the unit is used for the raw-water filter system. This section consists of two compartments each containing sand, with the provision that one can be used while the other is being backwashed. Approximately 2,000 lb. of sand is used in each compartment, with a coarse grade used in the lower portion of each compartment and a medium-fine grade used on top of the coarse base.

Raw water enters through a header (located above the compartments) which is equipped with two valves, opening out above each of the compartments. Incoming raw water may be turned into either of the two compartments. Outlet of each of the valves is equipped with a splash plate, consisting of a circular piece of plate steel used to divert the water downwards.

The compartments are used alternately 8 hours, with backwash taking place at the end of each 8-hour period. A large riser connects to the upper section of each compartment and provides an outlet for the backwash water to drain.

Condensate . . . The procedure in running oily condensate through the filter system is somewhat more complicated. This portion of the filter unit is built up as compared to the two-level sand boxes so gravity flow can be utilized as the condensate passes through the system.

Initially, the condensate is pumped overhead into an open baffle box, then the flow passes into the charcoal section. This is a compartment filled with about 1,200 lb. of regular hardwood charcoal. After the water passes through this charcoal bed, it is run through another compartment filled with gravel, then enters the water makeup tank.

All of the compartments are equipped with runoff sections to enable surface slop to be withdrawn to the sewer and to provide an outlet for backwash water. In the regular operation of the unit, charcoal is replaced about every 6 months and an access plate is included at the bottom of the compartment for this purpose.

Backwash . . . A unique method of handling backwash water is used in the unit, with the necessary piping positioned in a space between the charcoal and gravel compartments. This makes it possible to reach the lower sections of these two compartments as well as the sand compartments from this one location.

Incoming backwash water enters through a triangular manifold. This consists of three short sections of 2-in. pipe welded horizontally, with the backwash water entering in the middle of one side of the triangle. Lines, equipped with valves, run downward from each vertex of the triangle. One line ties into the bottom of the charcoal compartment, one to the gravel compartment, and the other one splits to tie into both sand boxes. Valves are located just beyond the split. They are operated by means of a rod running up to a point near the manifold.

In backwashing any compartment, it is only necessary to admit the backwash water to the manifold and then open the appropriate valve on a downcoming line to direct the water to the appropriate compartment. (Of course,

one additional valve has to be opened in the case of the sand boxes.)

The combination unit has been functioning satisfactorily in removing algae from the raw water and clearup up the condensate so that cooling tower and boilers are functioning without difficulties.

New meter checks moisture by electronics

by H. B. Weisbecker

A NEW instrument for determination of moisture in oil or natural gas has been developed and tested. This electronic instrument, the Teka Dielectrometer, not only measures samples but also measures directly in the pipe or vessel under the process pressure and temperature conditions.

The recorder may be located remote from point of measurement, away from hazardous locations. However, the measuring probe is nonsparking. Multipoint switching is incorporated. The instrument has a fast response. It is adaptable for measuring moisture content of other liquids and gases and of powders.

Operating principle . . . For oil, the dielectric constant is measured and compensated for the dielectric losses. For gas, the dielectric losses are measured and compensated for changes in dielectric constant. Any dielectric material (e.g., oil) is specified dielectrically by two quantities, dielectric constant ϵ, and tan δ, the tangent of the phase angle existing between resistive and capacitive alternating currents. For a parallel-plate condenser, the elementary relationships are:

$$C = \frac{A\epsilon}{4\pi d};\ I_R = \frac{E}{R};\ I_c = E\omega C;$$

$$\tan\delta = \frac{I_R}{I_c} = \frac{1/R}{\omega C} = \frac{1}{\omega CR}$$

where C = capacitance, A = plate area, d = plate separation, I_R and I_c are resistive and capacitive currents, R is the equivalent resistance of the dielectric, and $\omega = 2\pi F$ where F is the frequency of the applied alternating voltage E.

Moisture content of oil is determined by the difference between the dielectric constant of oil with water in it and of a sample of dry oil, i.e., the change in dielectric constant ϵ. For gas, the increase in dielectric losses, tan δ, is measured and here again the standard comparison is the tan δ of the dry gas. Even a small amount of water causes considerable change in ϵ as compared with the ϵ of dry oil.

Both Teka dielectrometer models utilize bridge circuits with null indication, amplifiers, self-contained a.c. sources, and power supplies for line operation.

Test results . . . The instrument has been tested on produced oil and gas in the field. It has also been used to check performance of a natural-gas dehydrating unit. A probe was installed to measure decline in the quantity tan δ, indicative of dielectric loss, as natural gas was turned into the glycol dehydrating unit.

For absolute moisture determination, the instrument will be calibrated at operating temperature and pressure. The permanent installation will employ probes at inlet and outlet of the dehydrating unit so that the difference in readings will be a measure of the effectiveness of the glycol unit and the humidity of the dehydrated gas. Probes will be located some 130 ft. from the recorder.

Author is with Technolog Co., 1560 Broadway, New York.

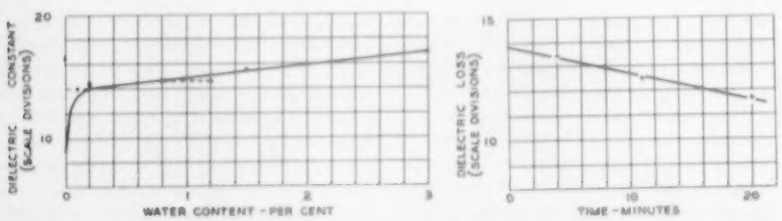


CHART at left shows relation between dielectric constant and water content of oil as obtained in field test. Chart at right shows change in dielectric loss of natural gas in terms of scale divisions, after glycol dehydration unit was placed on stream, as determined by Dielectrometer.

Earth-moving plus

THIS photo shows some of the work going on in completion of a job involving grading and building of tank firewalls for a Standard Oil Co. (N.J.) tank field near Bayway, N. J. One contractor, associated with other contracting companies in the over-all job, made good use of Gradall machines in applications other than earth moving.

The over-all job called for 18 tanks some 300 ft. apart, each with builtup firewalls. Caterpillar crawler-scrapers, Allis-Chalmers HD-20's and International TD-24's did the bulk of the earth moving. Four Gradalls were used by the contractor in final stages of the job. They came onto the job after a winter's erosion had weathered the previous work. They redressed the 8-ft.-high tank-firewall slopes and dug V-type trenches along their outer sides.

In adidtion, ditching involved the driving of sheet-wood piling which was done with the Gradall. In some places drainage had to be redesigned, ditching redone, and concrete pipe laid. The Gradall, with its standard grading blade rotated at the end of the arm, cleared the ditch for the pipe and laid the pipe. In another application the Gradall laid the hot-mix bituminous-concrete foundation for a tank berm.

Other uses . . . The machine was also used to give the tank-firewall slopes a final dressing of slag—now preferred to grass because of the lesser fire risk. Supply trucks dumped the slag into 10 by 10-ft. boxes. A Gradall, dragging a slag box behind it and using a 60-in. telescopic bucket on its arm, would then move along the course of the firewall, picking a load of slag from the box and spreading it on the grade.

PROOF OF CORROSION CONTROL

with *Visco*® ANTI-CORROSION TREATMENT

IT took only 30 days for the two steel coupons shown at right above to corrode almost away in the stream of a secondary-recovery well in Kansas. Both coupons, where not corroded through, are wafer thin. An anti-corrosion chemical was being fed at the rate of one pint per day, yet the average corrosion rate on the coupons was 216 mils* per year.

In the same well, Visco-treated with the same amount of chemical per day, the coupons at left above showed a corrosion rate of only 8.1 mils per year after 29 days' exposure.

Visco Chemicals cut the corrosion rate over 96%!

For corrosion control *results* and treating *economy,* call your Visco Representative, *now.*

*1 mil=.001 inch. A corrosion rate of 216 mils per year means that the corrosive attack, if uniform, would have corroded away the entire surface of the metal to a depth of .216 inches in a year. However, the real danger of high corrosion rates, as the coupon shows, is the much deeper and faster penetration occurring at localized areas.

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REJUVENATED PRODUCTION FROM 4 BOPD WELL

Large-volume, high-injection-rate treatment performed by DOWELL increased flow from 4 to 213 BOPD

A well did not maintain its initial potential of 286 BOPD. In fact, at the end of a year and a half, its production was down to 4 BOPD.

In reworking the well, the operator called Dowell engineers who recommended a high-injection-rate Sandfrac* treatment using 20,000 gallons of special refined oil with 1½ pounds of sand per gallon. The treatment was performed at an injection rate of 28 barrels per minute.

Five months later, the well still tested 213 BOPD, flowing. And new oil produced as a result of the treatment totalled 7,433 barrels!

Other wells on which this same method has been used, have gone from 25 barrels or less per day to 100, 200 and 300 BOPD. Injection rates up to 60 barrels per minute have been attained.

Although operations on this scale are not a daily occurrence in every field, it is another example of the kind of service you can expect from Dowell. A call will bring experienced engineers to help you get maximum production. Telephone the nearest office, or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. J-11.

**Sandfrac is a registered service mark of Dowell Incorporated.*

DOWELL SERVICE

fracturing services for the oil industry

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Effect of Mobility Ratio on Sweep Efficiency

by Dr. Ralph F. Nielsen

IN the previous number, for flow of a single fluid in a pattern of input and producing wells, it was shown how shape of the front might be calculated from pressure gradients along the streamlines. Such a calculation may be made from expressions for the pressure distributions.

Often, however, it is desired to make such calculations for irregular well arrangements. In such cases, models often have been used to find the equipotential lines. Shape of the front as a function of time has also been found by the use of electrolytic models.

In general, the viscosity of the displaced fluid will not be the same as that of the entering fluid. Furthermore, displacement is not usually complete, so that relative permeabilities may be different in the swept and unswept areas. There may be more than one fluid flowing in either or both areas, with saturations varying from point to point. A transition zone of considerable width may lie between the unswept area and that in which displacement is fairly high. In secondary recovery operations, an area of fairly high gas saturation may be ahead of the oil bank. As a result of such complicating factors, values of sweep efficiency determined for single-fluid flow are not generally valid for displacement of one fluid by another.

In dealing with problems on displacement efficiency, it has been found desirable to define a quantity called the mobility ratio, M. This is the sum of the mobilities in the unswept region divided by the sum of the mobilities in the swept region, the mobility of any fluid being the effective permeability to that fluid divided by its viscosity.

Because of the complexity of the problem, little systematic work has been done on pattern displacement except for the case in which the mobility is constant on each side of the boundary. For simplicity, if only oil is flowing in the unswept area and only water in the swept area,

$$M = \frac{k_{ou}\,\mu_{ws}}{k_{ws}\,\mu_{ou}}$$

where s and u refer to swept and unswept region.

Dyes, Caudle, and Erickson[1] have published the results of experimental investigations in which the mobility ratio was varied. Their method consisted of the use of thin porous plates and X-ray photographs. Recoveries before and after breakthrough were determined for the five-spot, line drive, and staggered line drive, the last two being for the case in which the distance between rows is equal to the distance between wells in a row.

Figs. 1 and 2 are replots of the data of Dyes et al. for a five-spot. For unit mobility ratio, as mentioned in the last number of this series, 70 per cent of the area has been swept when the driving fluid (water) cusps into the well. With higher mobility ratios (e.g., lower oil viscosity) the cusp is not so sharp and the sweep efficiency is higher.

Fig. 1 shows the effect of mobility ratio on area sweep at breakthrough and at different fractional flows of water, f_w, after breakthrough. [Water-oil ratio $= f_w/(1-f_w)$]. Fig. 2 shows the total displacement pore volumes D.P.V. (5-spot pore volume times saturation change on displacement) injected to obtain a given sweep efficiency. Points on the abscissa correspond to breakthrough.

To illustrate the use of the figures, with a mobility ratio of 0.2 only 52 per cent of the area is swept at breakthrough. To sweep 90 per cent, that is, to obtain 0.38 more displaceable pore volumes (D.P.V.) of oil, 2.5 D.P.V., or two additional, must be injected, the final water-oil ratio being about 20. Thus, 2.5 – 0.9 or 1.6 D.P.V. of water are produced. It is apparent that even when breakthrough occurs at a low sweep efficiency, a considerable additional area is swept before the water cut becomes prohibitive.

Even if a region of high gas saturation precedes the oil bank, or if the transition zone forms part of the swept area, these curves should be good indications of the effect of mobility ratio on sweep efficiencies.

Reference

1. Dyes, Caudle, and Erickson, Trans. A.I.M.E. 1954, p. 27.

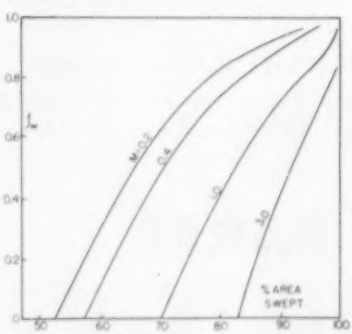


Fig. 1—Relation of area swept to fractional water production after breakthrough in a five-spot, for various mobility ratios. (From Dyes, Caudle, and Erickson).

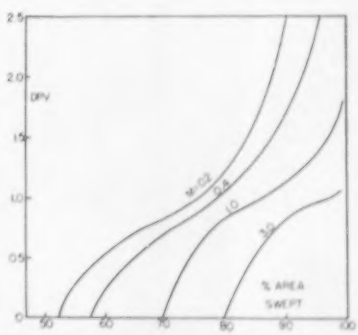
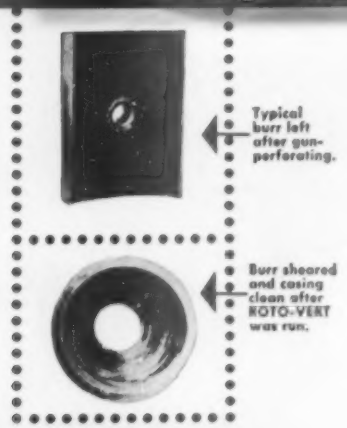


Fig. 2—Relation of area swept to total displacement pore volumes injected in a five-spot, for various mobility ratios. (From Dyes, Caudle, and Erickson).

Author is associate professor of petroleum and natural-gas engineering, Pennsylvania State University.



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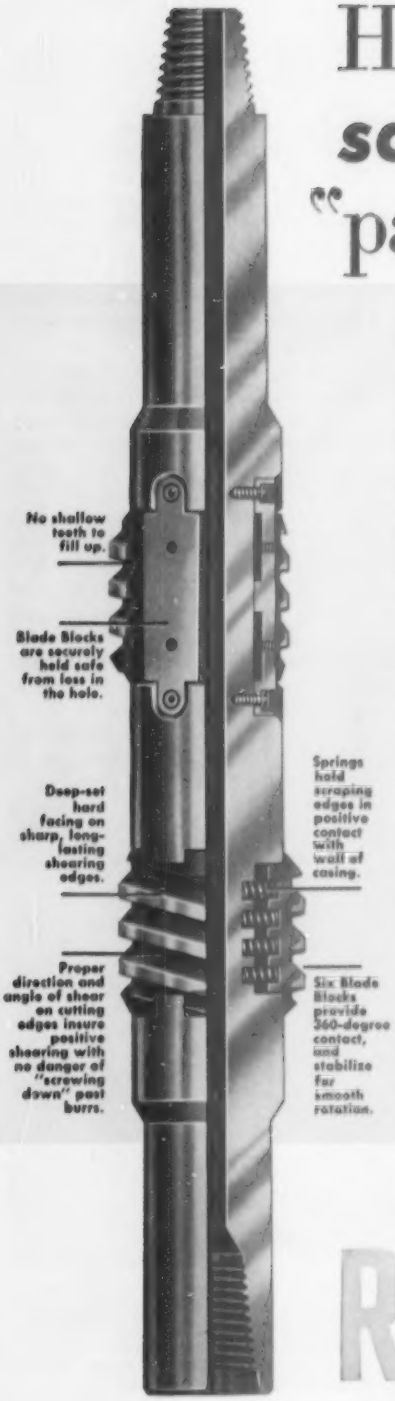
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ELECTRIC LOGGING—41

What Affects Resistivity of Permeable Beds

by R. I. Martin

OPPOSITE a permeable bed a mud cake is formed, and the formation is invaded to a greater or less extent. Two limiting conditions are possible depending on whether the invaded zone is less resistive or more resistive than the uncontaminated formation.

The first case is the simplest as far as interpretation is concerned. Fig. 1 shows a possible resistivity distribution for this case (Case P_2). The resistivity of the mud cake, Rmc, has been assumed to be twice the resistivity of the mud Rm. The resistivity Rxo immediately behind the mud cake, where the displacement by mud filtrate may be almost complete, has been taken equal to 10 times Rm. This will correspond, approximately, to a formation factor of the same order.

On the left of Fig. 1 approximate values of the microresistivities are shown. The long spacing gives the highest resistivity, and this type of separation between the microresistivity curves is defined as positive, Case P_2. The short spacing measures a resistivity which is largely that of the mud cake, while the long spacing is more affected by the resistivity in the invaded zone.

If the mud cake is thin, and if the resistivity in the invaded zone is high, then the short spacing will record higher values than those just mentioned. Also, Case I_1 could result in positive separation of the curves. In order to differentiate between these two cases, a working rule is to require that the resistivity of the short spacing is less than a certain multiple of the mud resistivity depending on the mud resistivity.

R_{llm} is equal to about 10 to 15 Rm for fresh mud greater than 1 ohm-m, 20 to 30 Rm for average mud 0.1-1 ohm-m, 40 to 50 Rm for very salty mud, less than 0.1 ohm-m.

In the second case, the resistivity of the invaded zone is higher than that of the uncontaminated formation such as will occur for salt-water-bearing beds.

Fig. 2 shows a case where the invasion is moderate. The short spacing is affected mostly by the mud cake, while the longer spacing records the resistivity in the invaded zone. Consequently the separation obtained is the same as for Fig. 1 which represented an oil zone.

If the invasion is less, as in Fig. 3, it is possible that no separation may be obtained, Case P_1. Reference to the S.P. curve will have to be made in order to differentiate between this case and that of an impervious conductive bed such as the shale shown in Fig. 2 of the previous installment.

If the invasion is still less, as in Fig. 4, the separation may be negative, but is unlikely to exceed 20 per cent. This is also included in Case P_1.

It should be noted that the microresistivity for the 1 by 1-in. microlateral is the same in Figs. 1 through 4, which cases differ only by the value Rt and the depth of invasion. This illustrates the fact that the resistivity recorded by the short spacing is dependent on the resistivity of the mud cake, and the part of the invaded zone just behind the mud cake.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

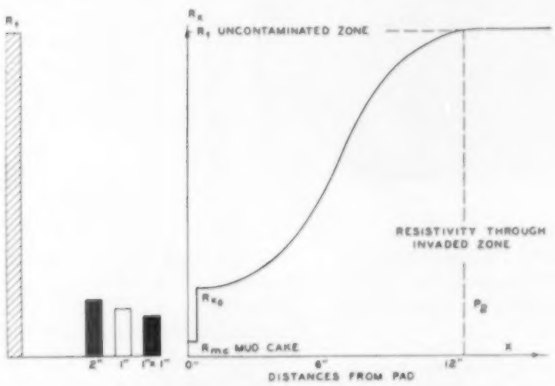

Fig. 1—Invaded permeable bed (oil bearing).

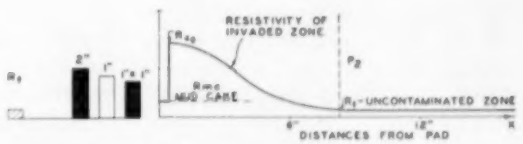

Fig. 2—Invaded permeable beds (water bearing).

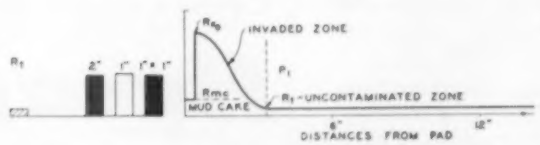

Fig. 3—Permeable beds with only moderate invasion.

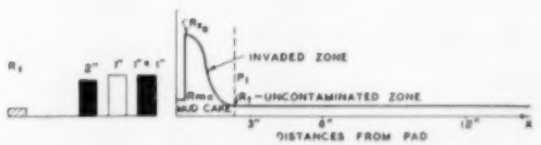

Fig. 4—Very slight invasion of permeable beds.

(All figures here from Doll, "The MicroLog . . .," Trans A.I.M.E., 1950, Vol. 189).

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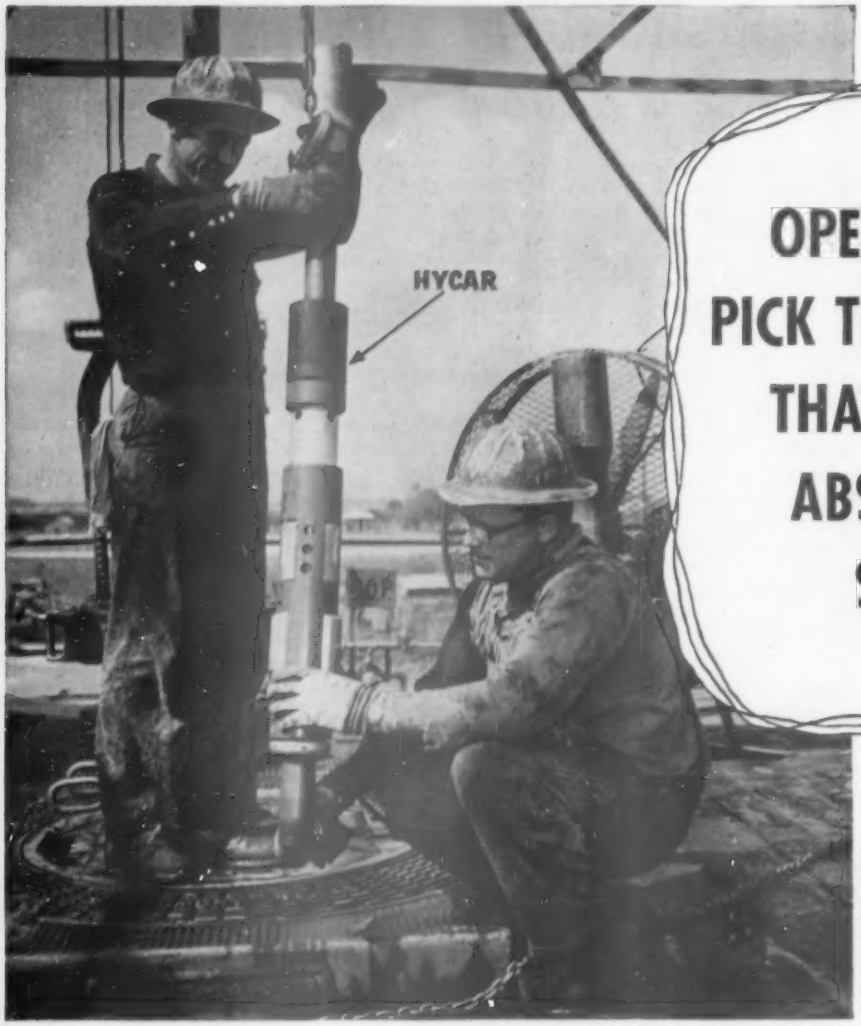

OPERATORS PICK THE PACKER THAT GIVES ABSOLUTE SEAL

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by T. W. Legatski
and H. J. Elder

Using More Natural Gasoline in Motor Fuels—2

TO establish the necessary background of equivalence in motor-fuel compositions, the results obtained in routine motor-fuel-quality surveys of filling-station samples are a most reliable source of information.

Fig. 1 covers a special survey made at three key points in Central Kansas on a week-by-week basis during 1953 where an even more complete picture was desired. Reid vapor pressures and corresponding 30 per cent evaporated averages of filling-station samples of motor gasolines have been cross-plotted to determine the quality pattern. The observed spread resembles that of the other areas examined.

Characteristics and Composition

What is the significance of these survey observations? What do the observations mean in terms of motor-gasoline composition? In Fig. 2 we have reproduced the motor-gasoline quality pattern of Fig. 1 by indicating only the boundary of the sample pattern, the individual points being omitted. Also, we have added to this figure a family of curves which express the approximate general relationship which exists between vapor pressure, 30 per cent evaporated temperature, and butane content. We use the term "approximate" in defining these lines because, although the general framework remains constant, the position of the framework shifts up or down depending on the characteristics of the base motor-gasoline stock.

Authors are with Phillips Petroleum Co. From paper given at N.G.A.A. Dallas meeting.

Iso-vapor-lock lines . . . Three other curves have likewise been added to this figure which are designated as lines of "prevailing practice," "more conservative," and "less conservative." These lines are iso-vapor-lock guide lines in that all fuel compositions which fall along any one of these lines will represent equal vapor-locking tendencies when used in cars having fuel-system vapor-liquid handling capacities of the order of 30 to 1. Lines of this sort have been fully substantiated in numerous road tests. They can consequently be accepted without any qualifications. Note that the so-called prevailing-practice line has been positioned on this figure so that it agrees with product characteristics along the upper fringe of the pattern. Locating the line at that particular level does not mean in any sense that an absolute limit has been established since products are regularly encountered year after year which fall considerably above that line. The chosen location for the line merely means that there is a tremendous backlog of information which indicates that the line should not be lower on the figure. Fuel compositions falling below the prevailing-practice line can be considered as being in proven territory.

Lastly, there have been outlined on this figure four small areas designated as A, B, C, and D. The boundaries of these areas represent the range in characteristics of the products of companies A, B, C, and D, the four having been chosen for illustrative purposes. The center of each of these small areas has been connected by an appropriate arrow to the established prevailing-practice line, the direction of the arrow being that which expresses the blending characteristics of butane in each case. It will be noted that companies A and B appear to be meticulously following a conservative sort of an iso-vapor-lock guide line. The differences in position for these companies is probably due to differences in the character of their raw materials and in the nature of the conversion processes which they employ. Companies C and D have products which miss the prevailing-practice line by rather wide margins. Company C could have blended an additional 4.3 per cent of butane without being above the prevailing-practice line. Similarly, company D could have blended an additional 6.6 per cent of butane. Point E in the center of the figure is our best estimate of the weighted average of all products falling below the prevailing-practice line for this area. This weighted-average product could have contained 3.3 per cent more butane.

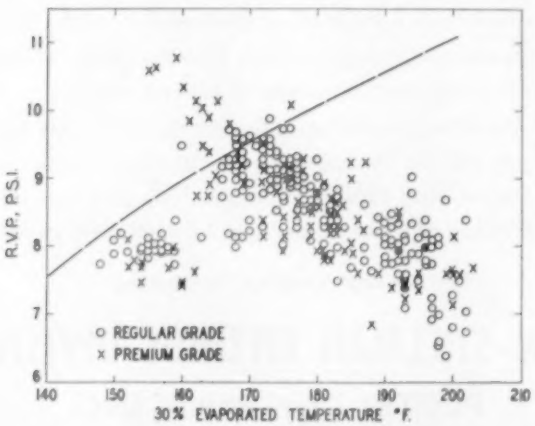


Fig. 1—Volatility of Central Kansas summer gasolines.

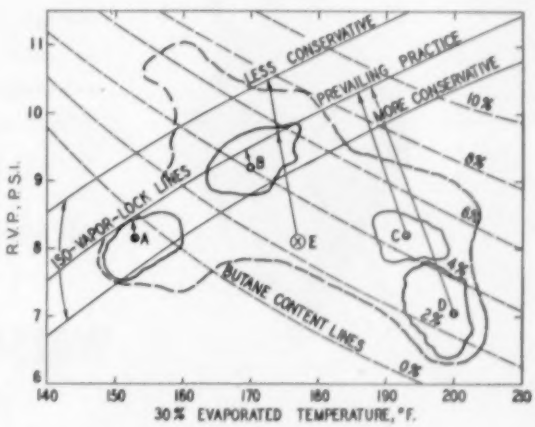
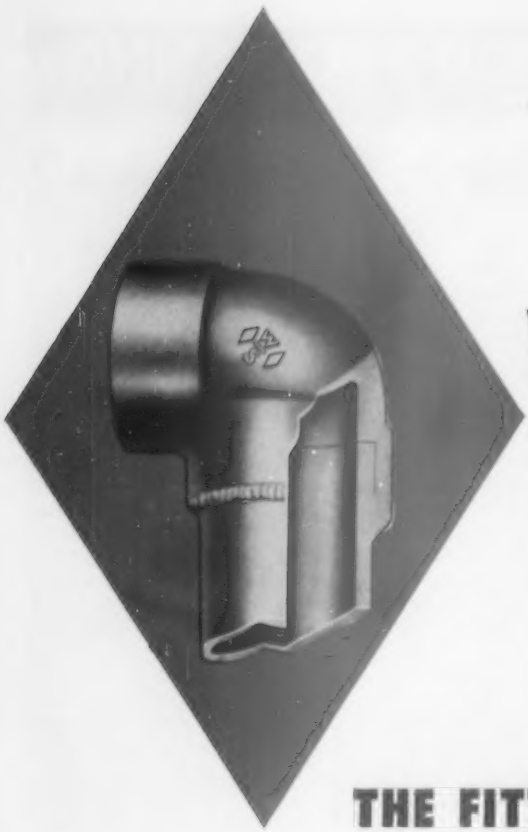
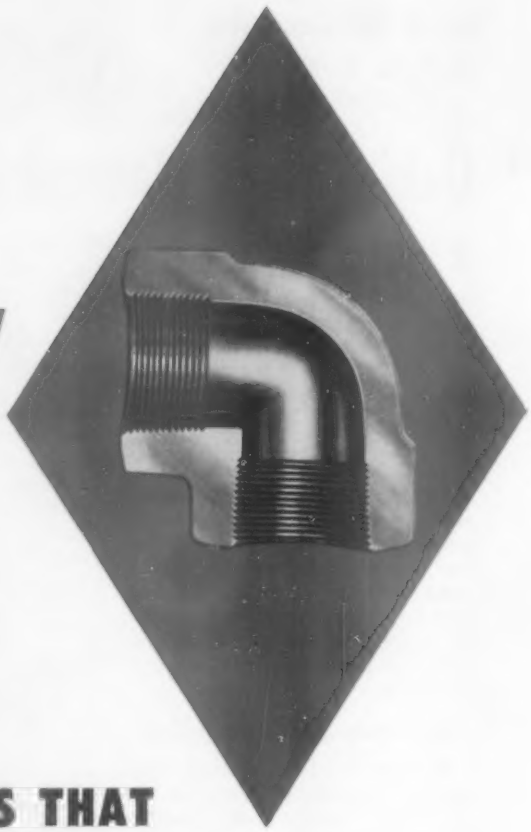


Fig. 2—Iso-vapor-lock chart, from Fig. 1.



W-S



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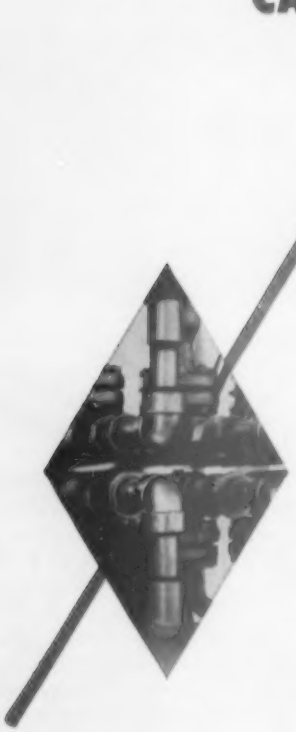

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by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

End Points of Distillation Fractions

"When we make a cut of, say, 12 per cent kerosine from a laboratory crude-oil distillation, what will be the end point of the kerosine product?" Wm.G.P.

The end point of the kerosine fraction will, of course, be a function of the distillation range that it represents in the crude oil. The relationship is not, however, a simple one. The A.S.T.M. end points of T.B.P. and Hempel cuts are indicated in Fig. 1. The meaning of the several curves of Fig. 1 and the triangle points is:

Triangle points . . . Average relationships for hundreds of 300, 400, 450, and 500 cut-point products.[1]

A.—A.S.T.M. end point versus T.B.P. cut temperature for gasoline fractions starting at T.B.P. temperatures of 200° F. or lower.[2]

B.—A.S.T.M. end point versus T.B.P. cut temperature for solvent or naphtha fractions starting at T.B.P. temperatures of about 300° F.[2]

C.—A.S.T.M. end point versus T.B.P. cut temperature for naphtha or kerosine fractions starting at T.B.P. temperatures of about 450° F.[2]

D.—A.S.T.M. end point versus T.B.P. cut temperature for gas-oil fractions starting at T.B.P. temperatures of about 500° F.[2]

E. and F.—A.S.T.M. end point versus T.B.P. cut temperatures for 300-ml. standard column distillations and for a 5-ft. packed column.[3]

G.—A.S.T.M. 90 per cent temperature versus temperature at 90 per cent of T.B.P. cut for all types of products (47 crude oils).

H.—A.S.T.M. end point versus Hempel cut temperature of the standard 45° F. Hempel fractions.

I.—A.S.T.M. initial boiling point versus Hempel start temperatures of 45° F. Hempel fractions.

Thus, for a kerosine fraction collected to a vapor temperature of 520° F. in a true-boiling-point distillation, an end point of about 496° F. (see curves B and C of Fig. 1) would be expected. Reading between curves B and C of Fig. 1, at a T.B.P. vapor temperature of 520° F., we find that the A.S.T.M. end point should be about 24° lower than the T.B.P. cut temperature.

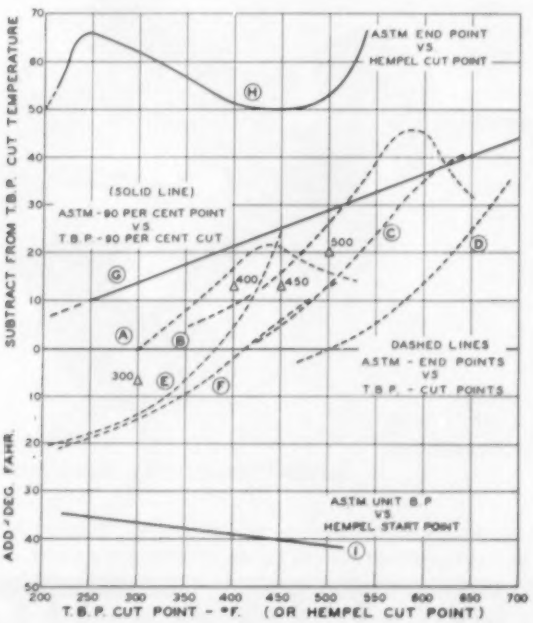
ASTM END POINT VS HEMPEL CUT POINT
(SOLID LINE)
ASTM - 90 PER CENT POINT VS T.B.P. - 90 PER CENT CUT
DASHED LINES
ASTM - END POINTS VS T.B.P. - CUT POINTS
ASTM UNIT B.P. VS HEMPEL START POINT
SUBTRACT FROM T.B.P. CUT TEMPERATURE
ADD - DEG. FAHR.
T.B.P. CUT POINT - °F. (OR HEMPEL CUT POINT)

Fig. 1—Approximate A.S.T.M. distillation characteristics of products in relation to cut temperatures of crude-oil distillations.

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3. Data of Good and Connell and of Garton, et al., used in The Oil and Gas Journal, of December 30, 1944, p. 277.

Structural Support For Refinery Vessels

"Inasmuch as the design of structural supports for large refinery vessels is specialized either with respect to civil engineering or to chemical engineering, I have difficulty in finding references about supports in general and the theory of their design. I hope you can suggest some articles." Z. J. M.

There is in actuality no basic difference between the application of structural design to refinery situations and the application of the same principles to other needs. Accordingly, little will be found in the literature about refinery structures, and the problem resolves itself into learning about the needs of the refining industry. However, the references listed here have been interesting enough to refiners to justify publication in magazines that serve the refining industry:

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2. Blank, W. H., Sliding Bearings for Hot Towers and Tanks, Pet. Refiner, Mar. 1945, p. 112.

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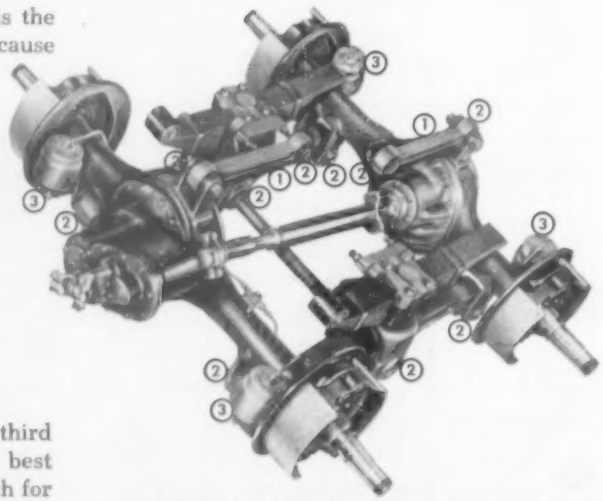

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Increasing Pipeline Capacity With Centrifugal Compressors —3

by Harold Woodhouse

WITH one compressor to a station, the conditions of operation are as shown by Fig. 3, Installment No. 1. These are reproduced in Fig. 7 by the compressor suction-pressure envelope marked (1) and the pressure ratio is as before, P_2/P_1.

If a second centrifugal is added in series with the first, the possible range of station-inlet pressure for the compressors to maintain station-discharge pressure P_2 is that portion of the pipeline characteristic curve lying within the envelope marked (2).

Similarly, additional centrifugals may be added in series and the combined performance envelopes will be as shown marked (3) and (4). The range of operation at normal speed is increased from A to D with an over-all station ratio of P_2/P_{1d} and the flow to (4D) M.M.s.c.f.d.

By changing the number of units in operation and varying the speed, total range of operation is extended to include all of that portion of the pipeline characteristic curve covered by the envelopes (1) to (4).

Author is chief engineer, Dean Hill Pump Co., and consultant on compressor design.

Suction pressure and volume . . . We have previously considered (in connection with Fig. 4, Installment No. 2) that a lower suction pressure automatically results in a larger Q and Q/N for constant speed, in terms of standard cubic feet, since these lines—referred to inlet conditions—slope toward lower M.M.s.c.f.d. when plotted with pressures as ordinates. So point A, in Fig. 7, would automatically result in a larger Q if its pressure were reduced to P_{1d}. In addition to this change resulting from drop in suction pressure, point D has moved over to a greater flow in M.M.s.c.f.d.

Therefore, in this example of four centrifugals in series, it is seen that the inlet suction volume of the first compressor on the station-inlet side has increased on two counts, and the same reasoning will apply to the second and third compressors in line to a decreasing extent. With the fourth compressor in line (that is, the original single compressor) only the increased M.M.s.c.f.d. will be effective in increasing Q because we are assuming that all four compressors are maintaining normal, or 100 per cent speed, by referring to point D, Fig. 7.

Actually, the original compressor would need more horsepower than originally supplied in order to do this, since it would be producing the same head as before but pumping a larger mass flow. If the horsepower had to be kept constant, it would be necessary to turn down the outside of diameter of the impeller to reduce its head. With this done, its pressure ratio would be less than before and its suction pressure would, therefore, be higher than before. With a higher suction pressure than originally, the increased Q due to a larger M.M.s.c.f.d. flow would actually be slightly nullified.

From the preceding, it is seen that when adding new centrifugals in series it is desirable to add them on the station-suction side because the new units can be initially designed to handle at a maximum efficiency the larger-volume flows required.

Fortunately, since pipeline centrifugals are designed for extremely conservative gas-flow velocities, it is possible to use the volute over a wide range. This reduces the number of sizes of machines required. They are also built to accommodate different diameters and widths of impellers, and this permits each compressor to be designed for its specific place in the station without changing the frame size.

Increasing number of stations . . .

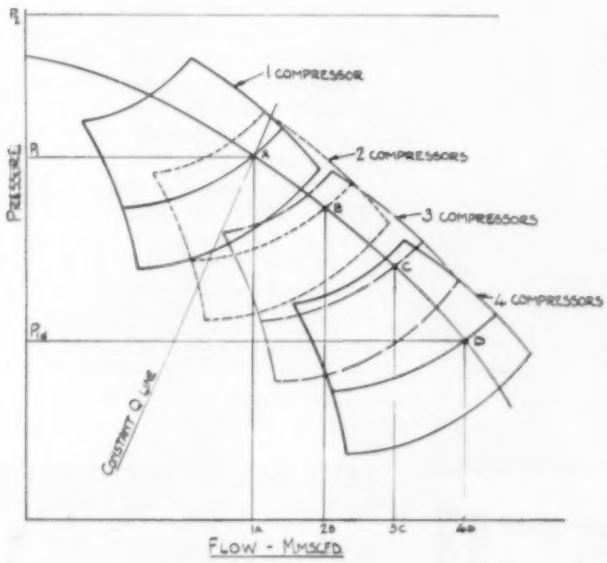
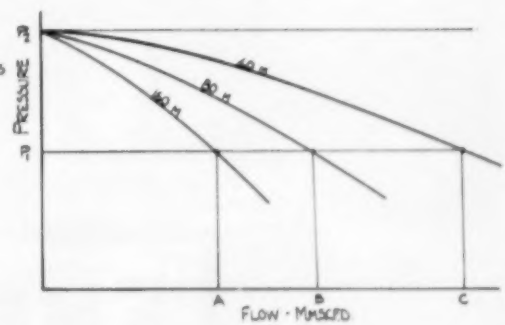


Fig. 7—(Left) Combined performance envelopes for centrifugal compressors in series.

Fig. 8—(Below) Suction-pressure pipeline characteristics for three different station spacings.



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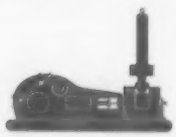
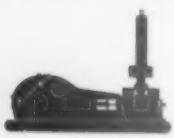
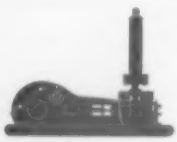


D-500: Hp. input
500 @ 65 rpm.



D-300: Hp. input
300 @ 70 rpm.



D-175: Hp. input
175 @ 75 rpm.

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E-175

Many gas pipelines have been originally laid with wide spacing of compressor stations equipped with high-pressure-ratio reciprocating compressors.

One logical way of increasing pipeline flow is to add additional intermediate stations. Sometimes reciprocating compressors have been put in these intermediate stations but, because the pressure ratio is generally small, the centrifugal compressor is now widely used and being considered for this type of change.

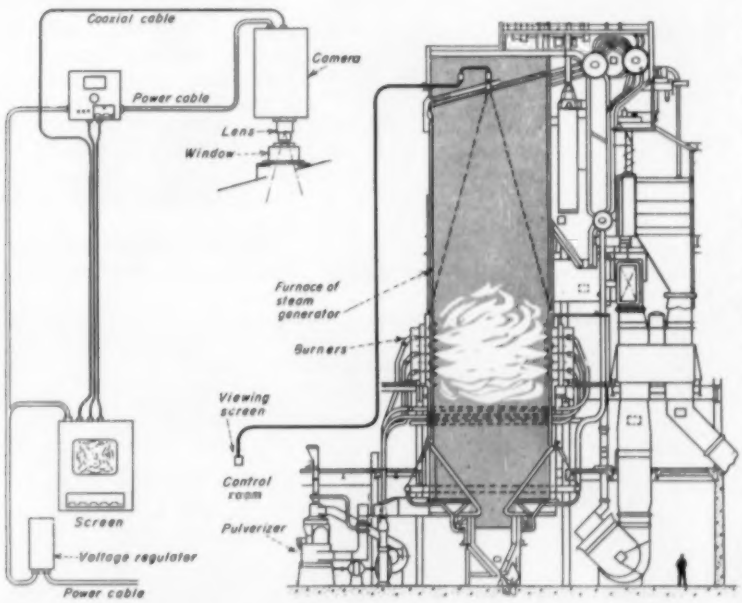
Station spacings . . . Referring to Fig. 8, the suction-pressure pipeline characteristic curves are shown for three different station spacings. This illustrates how, with the same suction and discharge pressures P_1 and P_2, the through flow is increased progressively from A to B to C by reducing the station from 160 to 80 miles and then to 40 miles.

The centrifugal compressors would be designed according to the station spacing and flow conditions required.

This concludes the series of three installments on increasing pipeline capacity with centrifugal compressors. Next will be a new series by the same author dealing with series versus parallel arrangement of centrifugal compressors for gas-pipeline stations.

References

1. Woodhouse, H., "Centrifugal-Compressor Performance Curves," The Oil and Gas Journal, February 15, 1954, p. 166.
2. Woodhouse, H., "Specific Speed Centrifugal Compressors," The Oil and Gas Journal, issues of October 5, p. 293, October 12, p. 161, November 19, p. 153, and October 26, p. 145, 1953.



HOW TV IS USED to follow operations in the power plant. The camera is mounted in the boiler furnace over the fires, enabling the operator to watch combustion from a remote control room.

Checking Operations by TV

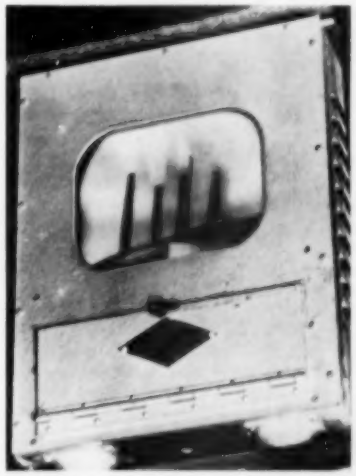
THE operator in his control room now can watch something that has never before been watched closely and continuously . . . combustion conditions within a large boiler furnace.

He does it with wired television. The camera is located on the roof of the tangentially fired furnace. Throughout operation the operator can see exactly what is happening. He sees instantly any loss of ignition and whether firing conditions are correct. This "Utiliscope" system brings greater realism to centralized control and it has a high eductional value for training purposes.

Applications in the petroleum industry are obvious.

Smoke is a nuisance which in many communities draws a penalty. Also it is often a sign of inefficient operation. To avoid both penalty and inefficiency, many fuel users are arranging for ways of watching their stacks. One way is with wired television. It can watch any number of stacks continuously. The operator at the boiler firing floor has a clear view of stack emission on his viewing screen. The Utiliscope camera may be as far as 1,500 ft. from the viewing screen without auxiliary equipment.

The operator can also watch boiler-water level on the monitor screen at any point, no matter how inaccessible the actual gage. The system operates as "fail safe" instrumentation. It either gives a correct reading or signals trouble by giving no reading at all. It eliminates line-of-sight mirrors and duct work and often saves manpower by eliminating a gage tender.



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REFINING

More Ammonia

Sun announces large plant at Marcus Hook

PHILADELPHIA.—Sun Oil Co. will enter the ammonia field with the construction of a 300-ton plant at its Marcus Hook, Pa., refinery.

Robert G. Dunlop, president of Sun, said his company decided to build the plant after a study disclosed consumption of ammonia in the United States had doubled in the past 5 years and that it showed a great potential for future growth.

Sun's new plant, which will be completed late next year, will cost $9,000,000 and will utilize byproduct hydrogen from two reforming units at the refinery.

At present, Atlantic Refining Co. has the only other ammonia plant in the northeastern section of the United States. Its plant at Philadelphia has a capacity of 100 tons daily and just recently has gone on stream.

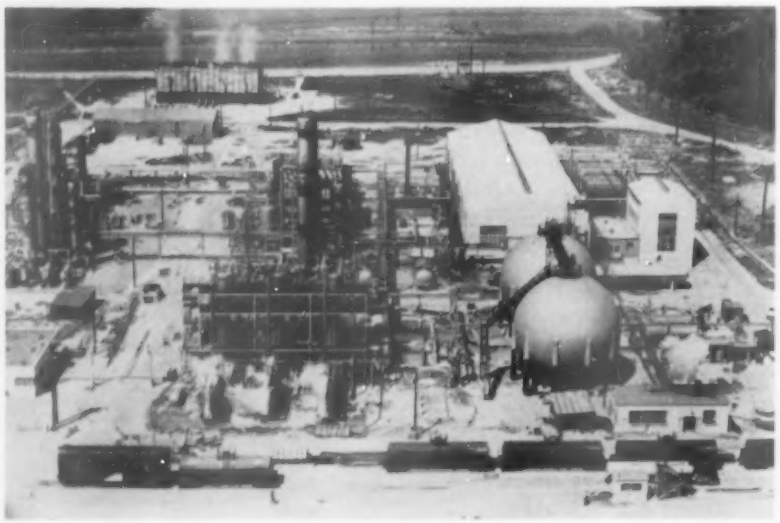
Nationally, only three tons out of every 10 produced are consumed by industry; however, Sun expects to market at least three-fourths of its ammonia to industry because of the location of its refinery in an industrial rather than an agricultural area.

Dunlop also said that Sun was completing work on a plant employing a new process for treatment of lubricating oils. The new unit utilizes hydrogen and a catalyst, and, according to Dunlop, will enable Sun to make a higher quality oil than it has ever made before.

Reformer Operation Begun

TORONTO.—Trinidad Leaseholds (Canada), Ltd., has commenced operations in the new 1,500-bbl. per day Platforming unit recently completed at the Port Credit, Ont. refinery. The company has announced plans to double present capacity of the 7,500-bbl. per day refinery, with work scheduled for completion early next year.

The new Platformer is licensed by Universal Oil Products Co. of Des



Another Ammonia Plant Increasing Capacity

Three expansion projects—one completed and two under way—will increase the ammonia production of the Mississippi Chemical Corp.'s plant in Yazoo City, Miss., from 120 tons to a total of 290 tons per day. All of the increased output will be used as fertilizer; part of it will be distributed as anhydrous ammonia, and a part will be converted to ammonium nitrate. The first addition to the plant was placed in operation in January 1954 and increased the capacity of the facilities from 120 to 195 tons daily. In the second expansion project, a unique scheme is being employed to increase the capacity of the existing plant. A second stage of carbon monoxide conversion and carbon dioxide removal followed by a single stage low pressure (10 psig.) methanation step is to be added. The original high pressure (100 atmospheres) methanation step is to be eliminated and the methanator vessel modified to an ammonia synthesis converter. The third expansion project will add a fourth multitube reformer furnace. The furnace, which will be ready in December, will boost capacity to 290 tons. The Girdler Co. is performing the design, engineering, and construction services.

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New Unit Tested

Sinclair-Baker catalyst RD-150 gets good results

CHICAGO.—Pure Oil Co. is now conducting test runs on the 3,000-bbl. per day catalytic reformer recently completed at Heath Refinery, Newark, Ohio. The unit is the first to employ the platinum catalyst RD-150 developed cooperatively by Sinclair Research Laboratories and Baker & Co., Inc.

Cold circulation commenced in early September and the unit officially went on stream September 20. To date it has performed with excellent results according to reports from Newark.

The unit incorporates feed pretreat facilities which utilize a portion of the net hydrogen production from catalytic reforming to desulfurize naphtha charge stocks. The unit was designed and built by the M. W. Kellogg Co., New York.

Sohio Names Plant Manager

CLEVELAND.—Donald G. Stevens has been appointed manager of the $17,000,000 anhydrous ammonia plant

D. G. STEVENS

G. B. RYAN

to be built at Lima, Ohio, by Standard Oil Co. (Ohio). He formerly was chief of the technical service division, manufacturing department.

Granville B. Ryan, former assistant to Sohio's vice president for manufacturing, was named manager of the market and product development division.

Edward F. Morrill, general manager of Sohio's new petrochemical department, also announced that William H. Ringler, former senior engineer, technical service division, will become Ryan's assistant.

Construction of the Lima plant, which will mark the entry of Sohio into the petrochemical field, will begin soon. The plant is expected to be completed late next year.

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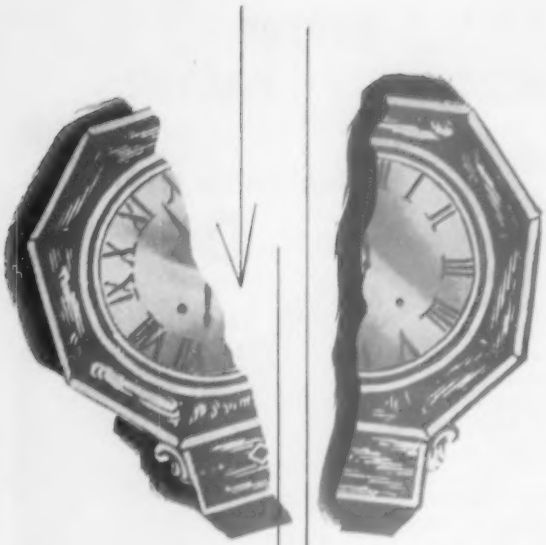

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Area Drilling Chapters Complete Officer Lists

All 16 area chapters of the American Association of Oilwell Drilling Contractors have completed selection of new officers for the ensuing year. The complete list by chapters, as compiled by the association's headquarters at Dallas, follows:

ARKANSAS-LOUISIANA-TEXAS

Chairman, R. W. Waddell, Delta Drilling Co., Box 2012, Tyler, Tex.; vice chairman, M. Q. Petersen, Petersen Drilling Co., 306 Fairfield Building, Shreveport, La.; secretary, J. W. Arnold, Woolf & Magee, 676 Fair Foundation Building, Tyler, Tex.

CALIFORNIA

Chairman, S. I. Williams, Thomas P. Pike Drilling Co., 417 South Hill Street, Los Angeles; vice chairman, Frank A. York, Miller & York, Box 936, Bakersfield; secretary, Bob Sharp, Drilling & Exploration Co., Inc., Box 2, Station H, Los Angeles 44.

CASPER

Chairman, Ray A. Sing, Gabe McCall Drilling Co., Box 2068; vice chairman, Charles Prather, Peak Drilling Co., Inc., Daly Building; secretary, Joe Webster, Fitzpatrick Drilling Co., 433 South Grant Street, all of Casper, Wyo.

CORPUS CHRISTI

Chairman, C. F. McCauley, Oil Well Servicing Co., Box 3246; vice chairman, Bill McKenzie, McKenzie Drilling Co. 717 Wilson Building; secretary-treasurer, A. C. Miles, Oil Well Servicing Co., Box 3246, all of Corpus Christi, Tex.

DENVER

Chairman, R. L. Nicholas, Loffland Brothers Co., 220 Midland Savings Building; vice chairman, Will I. Lewis, Jr., Will I. Lewis Drilling Co. 303 U. S. National Bank Building; secretary-treasurer, A. J. Courson, Dee Miller Drilling Co., 20 Paramount Building, all of Denver.

FORT WORTH-DALLAS

Chairman, J. Mark Gardner, Delta Gulf Drilling Co., Mercantile Bank Building, Dallas; vice chairman, M. L. Hart, Rowan Drilling Co., Inc., Fair Building, Fort Worth; H. D. Paxson, American Association of Oilwell Drilling Contractors, 321 Reserve Loan Life Building, Dallas.

HOUSTON

Chairman, H. J. Chavanne, Prince Drilling Co., 1605 Bank of Commerce Building; vice chairman, Morris McDannald, Mac Drilling Co., 3612 Telephone Road; secretary-treasurer, C. B. Webster, Hinkle Drilling Co., 609 San Jacinto Building, all of Houston.

KANSAS

Chairman, Collis P. Chandler, Jr., Musgrove Petroleum Corp., 518 Petroleum Building; vice chairman for western Kansas, W. A. Michaelis, Jr., Trans-Era Petroleum, Inc., 527 Petroleum Building; vice chairman at large, Jack Campbell, R. W. Rine Drilling Co., 320 Central Building; secretary-treasurer, Charles M. Powell, Powell Drilling Co., 909 Central Building, all of Wichita.

NORTH TEXAS

Chairman, Frank M. Denman, Jr., Denman Oil & Drilling Corp., Box 1826; vice chairman, Jack L. Cox, Cox Drilling Co., 925 Staley Building; secretary-treasurer, David A. Kimbell, Alan Drilling Co., 820 Oil & Gas Building, all of Wichita Falls.

PERMIAN BASIN

Chairman, E. G. Durrett, Delta Gulf Drilling Co., Box 866, Odessa, Tex.; vice chairman, W. C. Walker, Loffland Brothers Co., V & J Tower Building, Midland; secretary-treasurer, W. A. Taylor, Ralph Lowe, Box 832, Midland.

SAN ANTONIO

Chairman, Gordon W. Johnson, Texita Oil Co., Milam Building; vice chairman, Austin W. Mosley, Newman Brothers Drilling Co., Milam Building; secretary-treasurer, Carl W. Tennis, Field Drilling Co., 1409 Milam Building, all of San Antonio.

SOUTH LOUISIANA

Chairman, W. A. Grapes, Falcon Seaboard Drilling Co., Box 1314, Oil Center Station; W. C. Fatjo, W. C. Fatjo Drilling Co., Box 414; secretary-treasurer, Drew Cornell, Circle Drilling Co., Box 1000, all of Lafayette.

TRI-STATE
(Illinois-Indiana-Western Kentucky)

Chairman, George H. Pappas, Paco Petroleum Corp., Box 347, Mount Carmel, Ill.; vice chairman, Sam Tipps, Sam Tipps Drilling Co., 102 N.E. 4th Street, Fairfield, Ill., secretary-treasurer, Charles Pardee, Jr., Hotel Emmerson, Box 150, Mount Vernon, Ill.

TULSA

Chairman, J. L. Stauss, Falcon Seaboard Drilling Co., East Mezzanine, Stanolind Building; vice chairman, T. W. Wheeler, Loffland Brothers Co., Box 1649; secretary-treasurer, M. D. McBride, Arrow Drilling Co., 407 Philtower Building, all of Tulsa.

CENTRAL OKLAHOMA

Chairman, Robert B. McCloy, Bix X Drilling Co., Inc., 2905 First National Building; vice chairman, Gerald N. Eason, Fain-Porter Drilling Co., 2410 First National Building; secretary-treasurer, W. R. Ewert, Kerr-McGee Oil Industries, Inc., Kerr-McGee Building, all of Oklahoma City.

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Chairman, B. F. Gilchrist, Gilchrist Drilling Co., Box 469; George M. Straughn, Lauderdale & Straughn Drilling Co., 531 F & M Bank Building; secretary-treasurer, George D. Hunter, General Geophysical Co., Box 867, all of Abilene.

Milton Crow, Inc., Shreveport, is contractor on a 6,900-ft. Travis Peak test Latex Oil & Gas Co., Inc., is starting in northwestern DeSoto Parish,

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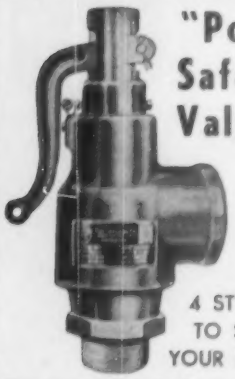

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North Louisiana. The test, 1 Holmes Unit, is on the Pettit trend between the Longstreet area, 2 miles to the southeast, and the Bethany development, in Caddo Parish, 3¼ miles to the northwest.

Drilling Exploration, Inc., Dallas, has two Nacatoch tests under contract for McAlester Fuel Co., of Magnolia, Ark. Their locations, about a mile apart, are 6 and 7 miles north of Coushatta, and about 1½ miles east of Bull Bayou field, in Red River Parish, northwestern Louisiana. They are listed as 1 and 2 Price.

Hap Drilling Co., Oklahoma City, to rework an old, abandoned wildcat test for P. G. Lake, Inc., also of Oklahoma City. The test, 1 Morris, located in northwestern Garvin County, Oklahoma, was drilled to 10,123 ft. The hole will be plugged back to approximately 9,000 ft., and sands above that depth retested. Location is east of the developing Southeast Bradley field, across the line in Grady County.

Berwick Drilling Co., Wichita, Kans., has a rig working for N. Appleman Co. on a wildcat test 3 miles west of Duquoin, in northern Harper County, southern Kansas. The test, 1 McIntyre, in 1-31s-8w, is 3½ miles east of Northeast Grabs pool. Hole is projected to 4,550 ft.

Petersen Drilling Co., Shreveport, and **Fortenberry Drilling Co.,** Natchez, Miss., have the contracts for two new Mississippi wildcat operations Calto Oil Co. is starting. Petersen is drilling at 1-B Crosby, in northern Wilkinson County, with location 2¼ miles west of the new Darrington field. Fortenberry's operation is at 1 Lisbony, 2 miles north of Church Hill field, in Jefferson County.

Cimarron Western Drilling Co., Tulsa, is keeping its three rigs busy. One is engaged in drilling development wells for Sapphire American Petroleum Co. in the Newcastle-Black Thunder area, in Weston County, Wyoming. Another is in the northeastern Colorado sector of the Denver-Julesburg basin, where it is drilling slim holes, most of them for Shell Oil Co. The third is working for Ervin Major in the Borger area, of Hutchinson County, Texas Panhandle. The two rigs of a sister company, **Cimarron Drilling Co.,** are operating in southern Oklahoma, one for Weimer & Fitzhugh, in Stephens County, and the other for Schermerhorn Oil Corp., in Carter County.

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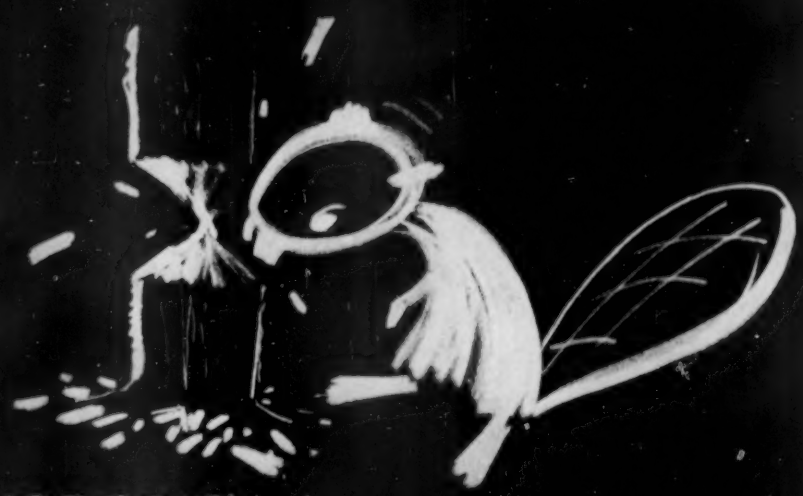

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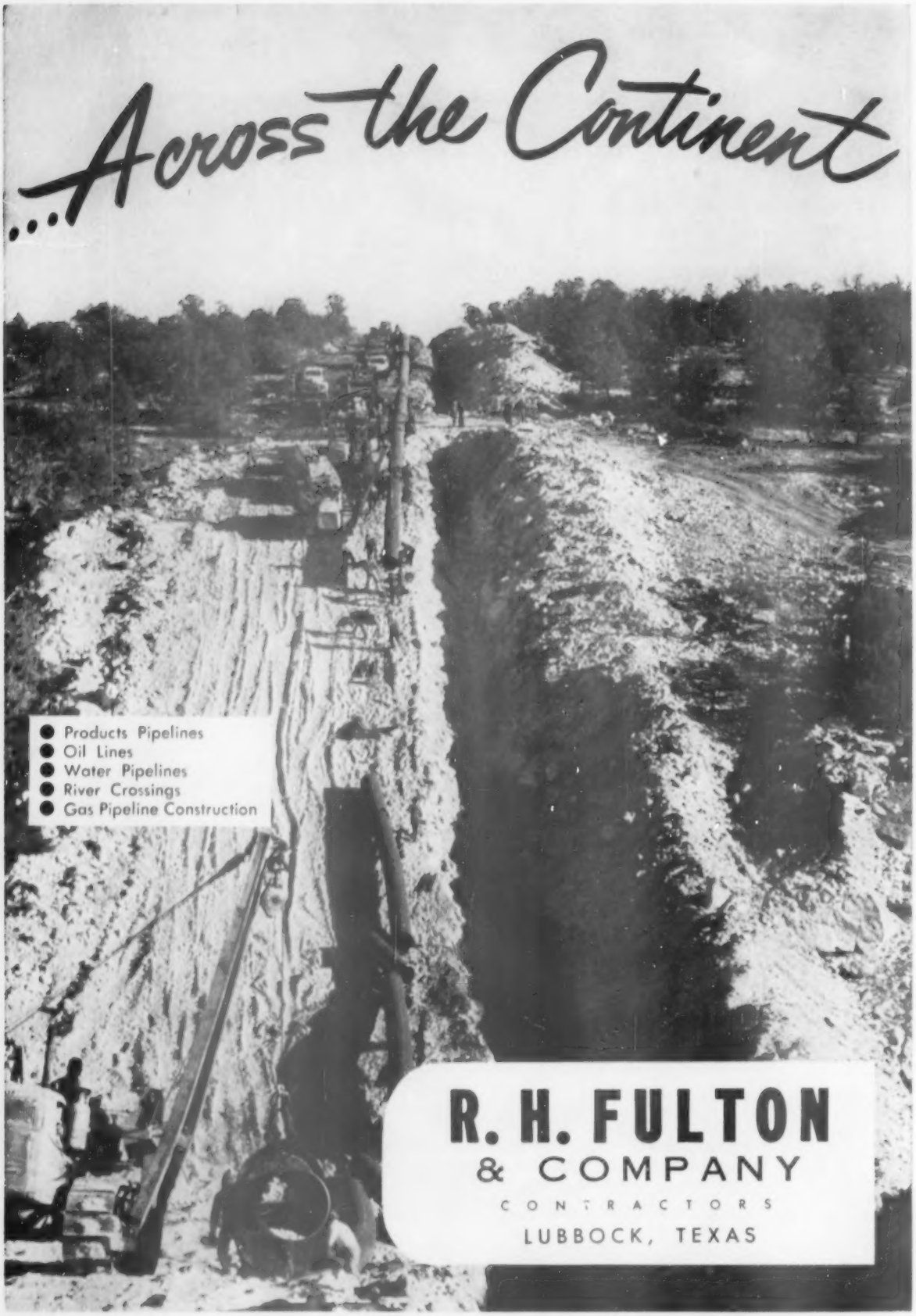

R. H. FULTON
& COMPANY
CONTRACTORS
LUBBOCK, TEXAS

Pipeline Patrol

. . . Report on Construction

Natural-Gas Link to Canada Underway

NATURAL gas will soon be going from the Gulf Coast of Texas to Toronto when work is completed on an 80-mile, 20-in. line between Niagara Falls, N. Y., and the large Canadian city. One of the obstacles to an easy pipe-laying job was this crossing of the Niagara River into Canada. Three strings, each 700 ft. long, were required for the two crossings. The pipe, pulled across the river by a winch on the Canadian side, required nine sideboom tractors to get it positioned for the pull. The line is one section of Trans-Canada Pipe Lines, Ltd., planned natural-gas transmission network which will serve Canada between Alberta and Montreal. The line is expected to be completed in 2 years.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Arapahoe Pipe Line Co.—This company owned jointly by Sinclair and Pure has let contracts on a 494-mile crude line from Merino, Colo., to Humboldt, Kans. The contracts were let in the following sections:

Section 2.—162 miles of 18-in. from Colby to Schurr Station, Kans., R. H. Fulton.

Section 3.—84 miles of 20-in. from Schurr Station to Burns, Kans., R. H. Fulton.

Section 4.—86 miles of 20-in. from Burns to Humboldt, Panama Williams Co.

Ar-Mex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude-oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude-oil line from Guernsey, Wyo., to Albuquerque.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Cheyenne Valley Pipe Line Co.—Company planning a 58-mile, 10-in. crude line from Lance Creek to Fort Laramie, Wyo. Line will cost $1,838,241 and will connect with the Platte Pipe Line system at Fort Laramie.

Continental Pipe Line Co.—Has awarded contract to G. G. Griffis Construction Co. to build 64-mile, 12-in. crude line from Oklahoma City to Ogg Station near Tonkawa, Okla. The line will give Conoco a complete 12-in. system between Wichita Falls, Tex., and the company's Ponca City, Okla., refinery.

Interstate Oil Pipe Line Co.—Company will

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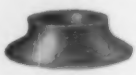

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PIPE LINE SURVEYS

Pipeline Patrol

build 32 miles of 8-in. crude line from Gwinville field of Jefferson Davis County, Mississippi, to the Soso field in the tri-county area of Jones, Jasper, and Smith counties, Mississippi. Completion set for December 1.

Magnolia Petroleum Co.—This company will operate a 48-mile, 12-in. submarine pipeline for itself and Continental Oil Co., and Newmont Oil Co. The line will run to blocks off the coast of St. Mary's Parish, Louisiana, and will have a capacity of 50,000 bbl. per day. Brown & Root, Houston, has the contract and expects to be finished by the middle of 1955.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000, is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming, to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

Shell Pipe Line Corp.—Company has awarded Anderson Bros. Corp. a contract to lay 35 miles of 12-in. crude line from Cabin Creek field in Montana to a tank-car loading rack on the Northern Pacific Railroad near Glendive, Mont.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. 12-in. line. Bids being asked.

Western Pipe Line Co.—This subsidiary of Service Pipe Line Co. has let contracts for 630 miles of 20, 22, and 24-in. crude line from Fort Laramie, Wyo., to Freeman, Mo. The western section of the line will be laid by H. B. Zachry Co. and the eastern section will be constructed by O. R. Burden Construction Corp. Completion set for December 1.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. 2d section of 32 miles from Lockport to Des Plaines, Ill., let to Contract and Material Co. of Evanston, Ill.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Cherokee Pipe Line Co.—Company will convert a recently purchased crude line into an aviation and jet fuel carrier from Ponca City, Okla., to Wichita. The company also plans to lay about 8 miles of line to complete the present system into Wichita. Line will serve refineries of Continental Oil Co., and Cities Service Oil Co., joint owners of Cherokee.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Malco Pipeline, Inc.—Company planning to build a 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

Oil Basin Pipe Line Co.—Midwestern Constructors, Inc., doing the work on this 230 miles of 8-in. products line from Laurel to Glendive, Mont. Cost: $5,350,000.

Phillips Petroleum Co.—Company has let 72 miles of 8-in. line to Somerville Construction Co. of Ada, Mich. Work being done between East St. Louis and Kankakee, Ill.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

Standard Oil Co. of Texas.—Company taking bids for the laying of a 248-mile, 6-in. products line from El Paso to Albuquerque. The line will move 5,000-bbl. daily when finished and will cost $4,000,000.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has asked FPC permisison to abandon "Little Inch" gas line. If permission is granted, company will spend $71,000,000 converting the line to a products line with a capacity of 235,000-bbl. per day.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles of 8-in. under way from Haines northward through Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Construction Co. are doing the work. Pipe laying will be through by November of 1954; however, entire job not expected to be completed until September of 1955.

Wyoming-Nebraska Pipeline Co.—Houston Contracting Co. has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebr. Work expected to be completed by November 1954.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Loupisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

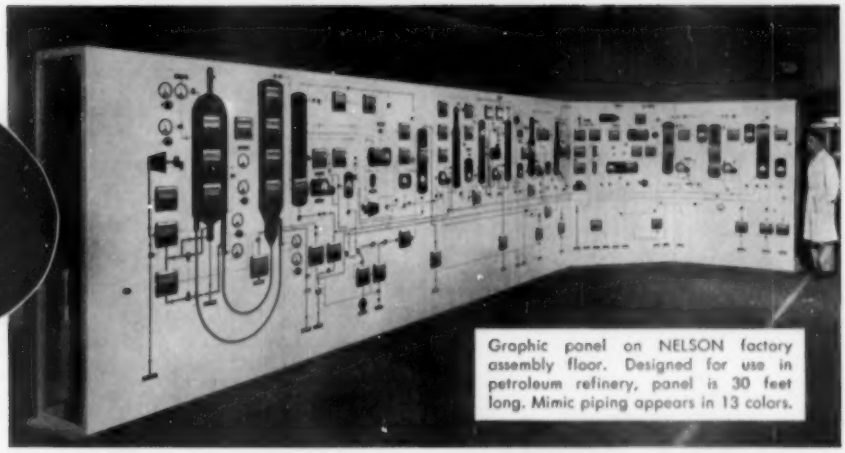
• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in., planned, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas. F.P.C. approved.

Nine miles of 20-in. to replace existing

ONE STOP SERVICE



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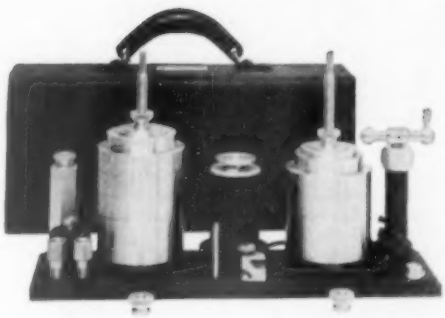

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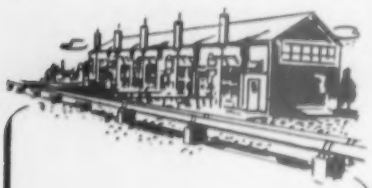

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Pipeline Patrol

16-in. line in Cherokee and Jasper counties, Missouri. F.P.C. approved.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., F.P.C. approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

Gulf Interstate Gas Co.—Company is winding up 860-mile, 30-in. job from Acadia Parish, Louisiana, to Boyd County, Kentucky.

• **Home Gas Co.**—Work under way on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Work under way on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., Doddridge, Wetzel and Marshall counties, West Virginia. Fulghum Contracting Co. doing work.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

Mid-South Gas Co.—Engineering Construction Co. of Tulsa has contract for 50 miles of various size pipe from Marion to Truman, Ark.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

Natural Gas Pipe Line Co. of America.—Company has proposed a 280-mile line from Wise County, Texas to Panhandle field in Texas where it would connect with the Peoples Gas & Light Co. line to Chicago.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co., and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Midwestern Constructors has finished one job for this company consisting of 5 loops of 94.3 miles of 30-in. line in Texas, Oklahoma, and Kansas.

93½ miles of 20-in. from Ogden to Waterloo, Iowa, being done by Hallmac Construction Co. of Houston.

90 miles of 16-in. from Waterloo to Dubuque, Iowa, being done by Engineering Construction Co. of Tulsa.

54 miles of 16 and 10-in. from Newton to Grinnell, Iowa, has been finished by G. G. Griffis Const. Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa, and 20 and 24-in. lines from Paullina to Sioux City being done by R. H. Fulton Co.

Two underwater crossings totalling 5,100 ft. being done by Lone Star Constructors of Dallas.

G. G. Griffis also has 118 miles of 2-12-in. between Rochester and Redwing, Minn., for Northern Natural.

Completion dates not fully determined.

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox., and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in

Lawrence, Jackson, Vinton, Hocking, and Fairfield counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in,. planned, paralleling Topock-Milpitas lines. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Panhandle Eastern Pipe Line Co.—FPC has given this company a temporary certificate to construct 295 miles of 30-in. looping to get additional gas to companies in Illinois, Indiana, Michigan, Ohio, and Missouri before cold weather. The job is costing $22,885,000 and is part of a $66,750,000 expansion program. The remainder of the program calls for $23,580,000 for new compressors and the leaching out of an underground storage cavity near Waverly, Ill., and $11,427,500 for production and gathering facilities improvements in the field.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—Company has awarded following contracts on 566.8 miles of 30-in. line from Kinder, La., to Portland, Tenn. Job 90 per cent completed.

98.7 miles from Kinder to U. S. Highway 84 near Jena, La., to Morrison Constructors, Inc.

90.2 miles from U. S. Highway 84 to Louisiana side of Mississippi River to Anderson Brothers Corp.

105 miles from Mississippi River to U. S. Highway 51 near Grenada, Miss., to Houston Contracting Co.

101.6 miles from Grenada to U. S. Highway 45 near Corinth, Miss., to Oklahoma Pipe Line Constructors.

94.9 miles from U. S. Highway 45 to near Centerville, Tenn., to Western Pipe Line Constructors, Inc.

75.6 miles from Centerville to near Portland, Tenn., to Panama-Williams Co.

63 miles, 26-in., under way, loops in Ohio and Pennsylvania. H. C. Price Co.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennnsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 382-mile, 24-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and

around a refinery...
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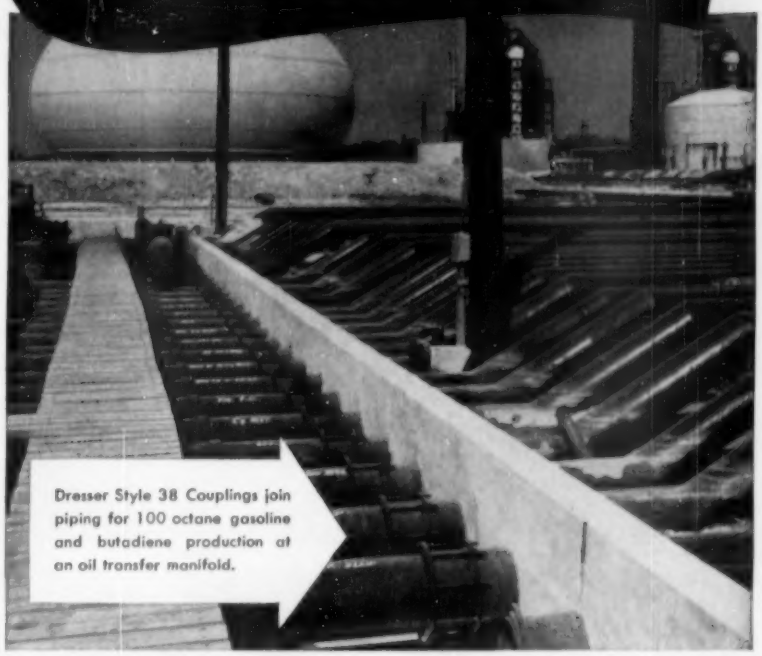

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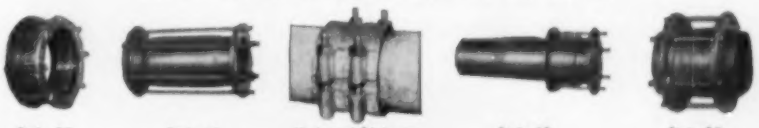

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*HYDREPAIR is a trade-mark of Dresser Manufacturing Division

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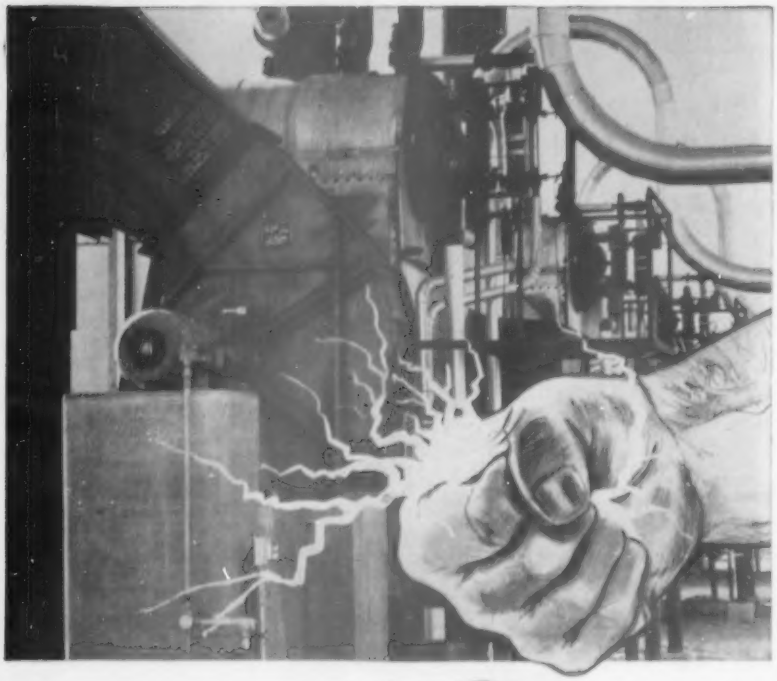
Dresser Manufacturing Division, 49 Fisher Ave., Bradford, Pa. (One of the Dresser Industries).
Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Airport Blvd., S. San Francisco, Calif.

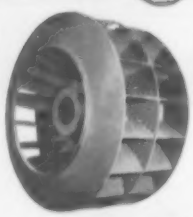
FAN-MADE HURRICANE PACKS A POWER PUNCH!



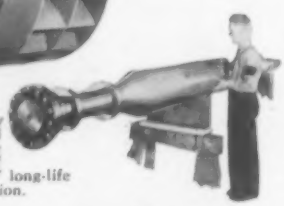
"BUFFALO" DRAFT FANS DO IT AT LOWEST COST

"Buffalo" Induced Draft Fans in this outdoor installation of a Texas gas firm draw hurricanes of hot gases from the boilers. "Buffalo" Fans stand up under this punishment. Power costs are lowered. Some of the "Buffalo" long-life, low-maintenance "Q" Factor* features are shown at right. In *your* power installation, you'll be money ahead now and *years* from now by specifying "Buffalo", the fans that have been keeping power costs down ever since draft was mechanized. Write for Buletin 3750 for all details!

* *The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.*



Efficient, factory-balanced wheels are of heavy steel plate with massive hubs and sturdy back plates.



Oversize, accurately machined shafts are typical of "Buffalo" long-life construction.

Bolted, sectional housing design provides accessibility to all fan parts.

"Buffalo" self-aligning water-cooled bearing for induced draft fans.

BUFFALO FORGE COMPANY
525 BROADWAY BUFFALO, N. Y.
PUBLISHERS OF "FAN ENGINEERING" HANDBOOK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Pipeline Patrol

replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Cost: $3,269,000. FPC approved.

Texas Eastern Penn-Jersey Transmission Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755.000. Line to be completed November 16.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October by Houston Contracting.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season during summer. Work resumed September 15.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

• **Pembina Pipe Line Co., Ltd.**—Company building 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans

NICOLET *Medium Weight* ASBESTOS PIPE LINE FELT
FOR COMPLETE PROTECTION WITH ECONOMY

Here's Why—

1. Lower Material Cost.
2. More coating and wrapping machine travel without changing rolls.
3. Save about one-half the freight.
4. More flexible asbestos felt which permits a tighter application for enamel penetration and keying-on action-free escape of gases.
5. Enamel losses and patching are less because of this longer travel without changing rolls.
6. Smoother exterior with less lap edge.

WE ALSO HAVE
No. 1 — Nicolet Regular 15#
No. 2 — Nicolet Perforated 15#
No. 3 — Nicolet Tufbestos
For Mill or Yard wrap, greater lengths may be had to 5000' long.

For the finest in Asbestos Pipe Line Felt . . . in all weights SPECIFY NICOLET—*"The Felt with a Proven Past and a Future"*

The Felt With a Future

MANUFACTURED BY:
NICOLET INDUSTRIES, INC.

70 PINE STREET
NEW YORK 5, N. Y.

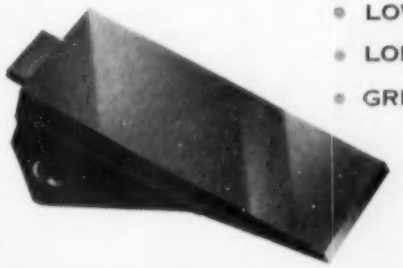
Now... M. J. CROSE MFG. CO., INC.

IS YOUR NEW SOURCE
OF SUPPLY FOR

H&L Teeth
that really Dig!

Made of high alloy steel forgings and uniformly heat treated to insure toughness and provide resistance against abrasion and wear. Quick changing by using only hammer and punch . . . points stay sharp . . . will not rattle off . . . no reversing.

- LESS POWER
- LOWER COST
- LONGER LIFE
- GREATER YARDAGE



Warehouse stocks carried in the following locations:
M. J. Crose Mfg. Co., Inc.—Tulsa, Oklahoma
Crose Pipeline Equipment Co.—Newark, N. J.
Crose-Curran Ltd.—
Edmonton, Alberta, Canada
Orders promptly handled through:
Pipeline Supply Co.—Houston, Texas
M. J. Crose Mfg. Co., Inc.—Denver, Colorado

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MANUFACTURING COMPANY, INC.
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SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY

Protect

Magneto Ignition Engines *Automatically* WITH

Murphy

"W" Series SAFETY SWITCHES

Internal combustion engines are stopped automatically on dangerously low oil pressure or high water temperature. Optional types of disconnect switches and mounting panels available.

Model W-275 features new MURPHY automatic lube oil disconnect switch. Pushbutton sets lockout. Normal lube oil pressure automatically resets switch when engine is started.

For Dual Magneto Ignition

MODEL W-275-D

Slightly larger cast tenzaloy panel than W-275 to provide mounting space for No. 101-D instant snap switch which grounds two magnetos when safety switches operate.

ALL MURPHY Safety Switches

are rugged, heavy-duty construction — and you can see them working.
A complete line of instrument panels for battery ignition and Diesel engines available from stock.
All MURPHY Safety Switches Are Guaranteed A FULL YEAR.
Write for Illustrated Literature

Sold by Engine Dealers and Supply Stores

FRANK W. MURPHY *Manufacturer*
BOX 1470 TULSA, OKLA.
BRANCH: LOS ANGELES 61, CALIFORNIA

Pipeline Patrol

Mountain Pipe Line Co., and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

• **Petroleos Mexicanos.**—145 miles, 12-in., under way, Jose Colomo to El Plan, Mexico.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 150 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished by November.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden,. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

Australasian Petroleum Refinery, Ltd.—Company plans two lines from the new Kwinana refinery in western Australia to the port of Fremantle to be completed early in 1955. One line will be 15 miles of 12-in. The other line will be a 17-mile, 6-in. line.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering c ontracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co., Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Union Gas Co. of Canada, Ltd.**—Proposed line from Lambton County gas-storage fields to Oakville. Line is being proposed now and will eventually join with proposed line from Alberta to Toronto and Montreal.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

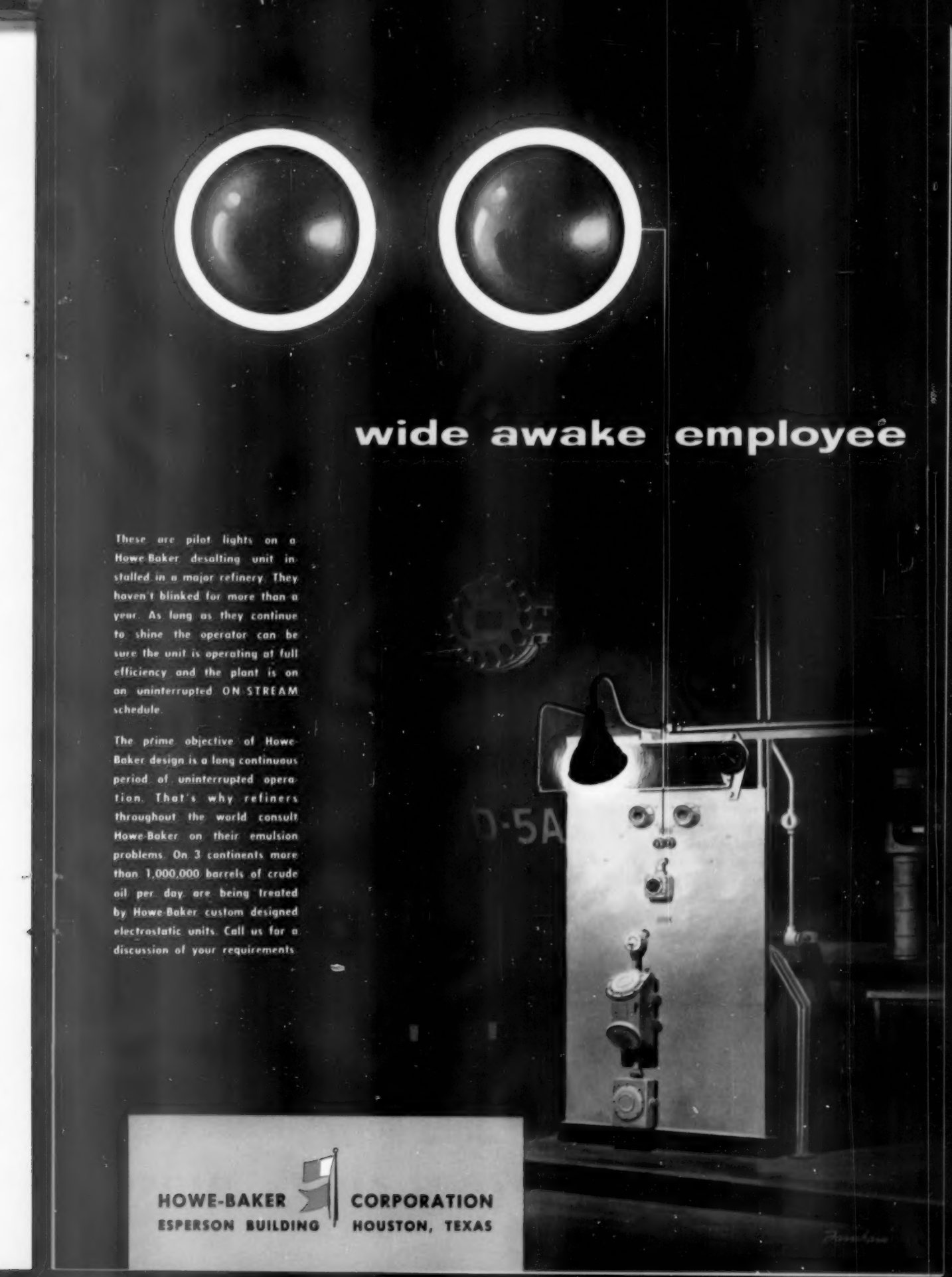
• **Western Pipe Lines, Ltd.**—Will build 80-mile, 20-in. line from Niagara Falls, N. Y., to Toronto. Gas will be furnished by Tennessee Gas Transmission and taken over in Toronto by Consumers Gas Co. Est. cost: $7,000,000. Canadian Bechtel, Ltd., doing engineering work.

"Why certainly, we'd be glad to furnish the pipe on your deal, Mr. Slykker."

wide awake employee

These are pilot lights on a Howe-Baker desalting unit installed in a major refinery. They haven't blinked for more than a year. As long as they continue to shine the operator can be sure the unit is operating at full efficiency and the plant is on an uninterrupted ON-STREAM schedule.

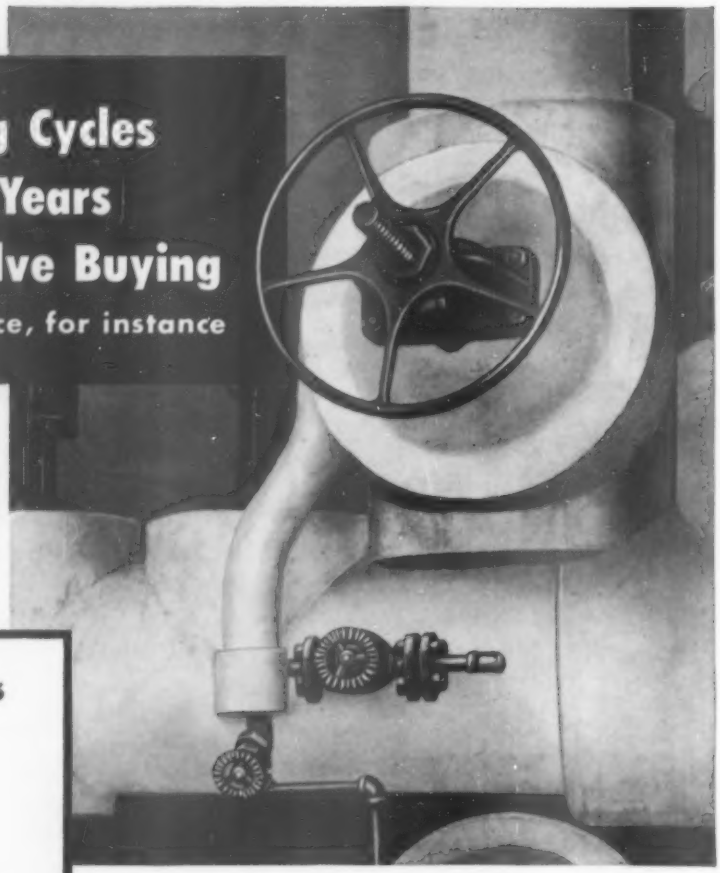
The prime objective of Howe-Baker design is a long continuous period of uninterrupted operation. That's why refiners throughout the world consult Howe-Baker on their emulsion problems. On 3 continents more than 1,000,000 barrels of crude oil per day are being treated by Howe-Baker custom designed electrostatic units. Call us for a discussion of your requirements.



HOWE-BAKER CORPORATION
ESPERSON BUILDING HOUSTON, TEXAS

1248 Operating Cycles Through 24 Years Prove Quality Valve Buying

. . . for main steam service, for instance



The Installation

At the Champion-International Paper Mill, Lawrence, Mass., featuring Crane 400-pound steel gate valve in main steam line to turbine. Working pressure: 400 psi at 600 deg. F.

Valve Service Ratings

SUITABILITY: Never a question

FEATURES: Quality throughout

MAINTENANCE COST: Not a cent

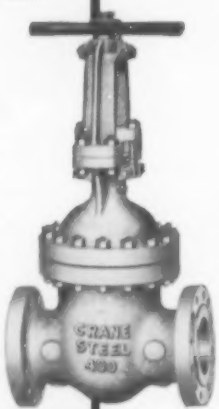
SERVICE LIFE: 24 yr.—still in line

OPERATING RESULT: Lower power costs

AVAILABILITY: Regular Crane Catalog item

The Valve

Improved constantly through the years, Crane steel valves for elevated pressures and temperatures are known and respected everywhere for outstanding, low-cost performance. They're made in the widest range of body and trim materials—in all pressure classes and sizes—with screwed, flanged, or welding ends. See your Crane Catalog, or consult your Crane Representative.



The Case History

Installed in 1930, this Crane valve has been in continuous use ever since. In 24 years the valve has not required service or maintenance of any kind.

More significant is the quality of performance of this 8-in. steel gate valve. Operated for week-end shutdown of the turbine, it has never failed to respond to the handwheel with smooth, steady action. Both seating and stem seal remain as tight as when the valve was first installed.

Performance like this begins in just one way—by making quality the first consideration when buying valves. Today, such a buying policy is sounder than ever and Crane quality, more than ever, helps assure the best results at lowest ultimate cost.

THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, IRON, STEEL

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Save Time

. . . Use These Handy Time-Saver Cards

Want more information on products advertised in this issue? Or do you want to know more about the items described in the "New Equipment Section"? Or would you like some of the literature here mentioned?

Let us get it for you

Just use the convenient pre-stamped cards on this page. We'll forward your requests promptly.

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Mark here FOR MORE INFORMATION ON ADVERTISED PRODUCTS

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This card void after 90 days.

Postage Will be Paid by Addressee

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NAME ..... TITLE .....
This card void after 90 days.

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The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

We do the rest

If you want additional information on any product advertised in this issue, note the page number on the card.

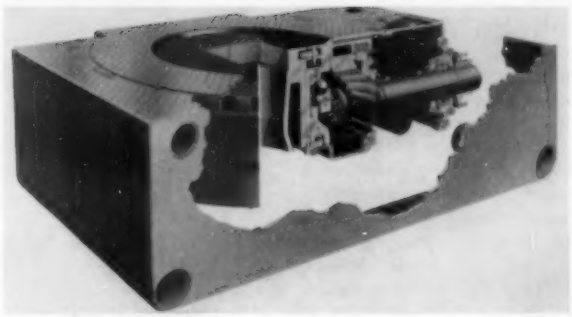
We'll get it for you

(No postage required)

. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller



New Rotary Table Has Extra Mud Protection

A new rotary table has extra protection against mud penetration as well as a table which is dynamically balanced during final factory run-in and inspection. The dynamically balanced table will eliminate primary stress and strain resulting from imbalance vibration. The balancing is accomplished during a high-speed run-in under inspection with a strobe-light device.

Mud proofing is accomplished with a triple labyrinth at the table top, a double labyrinth at the table bottom, and a system of flinger rings and shields at critical points. In extended field tests these protective measures have prevented the entry of mud at any point. The all-square housing of the rotary table facilitates flooring-up. It is designed without surface projections for safety and handling ease.

The quieter-running, spiral-bevel gears are lapped and matched sets. The main bearing consists of 25 hardened and ground balls running in a phenolic retainer. Spiral-bevel gears, main bearings and the inboard-shaft bearing run in a deep-sump oil bath. Lubrication of the outboard-shaft bearing is accomplished through grease fittings located under a door on the table surface. The table is locked by means of a recessed handle in the table top which operates a boltlike device. It engages in any of 32 indents around the table top, locking the table only. This locking design materially reduces the danger of damage to gears, bearings, and shaft due to shock from pipe tonging. The master bushing lock is a strong latching device recessed into the table top. For quickly changing the drive-speed ratios or to adapt the table to various draw works, bolt-on-type sprockets are furnished. These drive sprockets bolt to a hub mounted on the pinion shaft. When desired, a flexible oil-bath rotary-guard connection will be furnished.

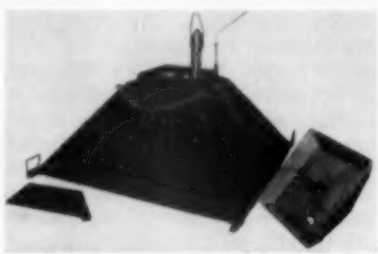
Three models available are: the S-21-A (21-in. opening with a 53¼-in. distance from center of table to center of sprocket); the S-17½-A short (17-in. opening with a 44-in. distance from center of table to center of sprocket); and the S-17½-A long (17½-in. opening with a 53¼-in. distance from center of table to center of sprocket). *Unit Rig & Equipment Co.*

Check No. 1 On The Time-Saver Card

●

Marine Survey Marker Is Set On Water Bottom

A new marine marker is used for the marking of a position in a marine survey. The marker is set on the water bottom at the desired position, thus making it impossible for the marker to be picked up or destroyed. To relocate, a charge of dynamite is fired in the general vicinity of the marker (¼ to over ½-mile radius, depending on bottom conditions). The marker gives an underwater sound signal in response to the explosion. This may be repeated as often as necessary to relocate the exact position.



A captive float on the top of the marker may be released when desired by firing two charges in a predetermined sequence. The float is anchored to the marker by means of a small cable. The float provides a visual means of relocation, and also a means of retrieving the marker. *Marine Marker Corp.*

Check No. 2 On The Time-Saver Card

●

Stainless-Steel Plug Valves Feature Chrome-Plated Plugs

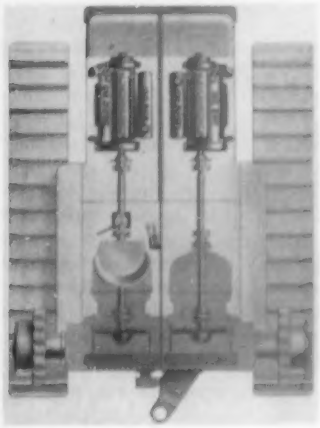
A new line of lower-priced stainless-steel Rockwell-Nordstrom lubricated plug valves is especially recommended for use in plants. Featuring chorme-plated plugs, the new valves are suitable for most services in which the more expensive stellite-coated stainless-steel valves have previously been used, such as services requiring stainless steel to

prevent contamination or corrosion.

The chrome plating backed by stainless steel offers double protection against scoring, galling, and other effects of corrosion. New valves are offered in the same sizes and types available in Rockwell's higher-priced line. *Meter & Valve Division, Rockwell Manufacturing Co.*

Check No. 3 On The Time-Saver Card

●



Euclid Tractor Is Powered By Two Diesel Engines

Utilizing twice the horsepower of tractors now in production, the Euclid tractor is powered by two 190-hp. GM diesel 6-cylinder engines, each driving an Allison torque converter and Allison torqmatic transmission. Each drive train independently powers one track. Final drive gearing is the same job proven Euclid planetary used in off-highway 50-ton dump trucks and the 25-yd. bottom-dump wagon.

Two separate drive and track assemblies are free to oscillate on a 7-in. transverse shaft. The Euclid twin crawler can be separated for shipment when weight and width restrictions are encountered. The two-section design also gives flexibility over uneven ground. The tracks maintain good traction because each half of the tractor maintains better ground contact in rough terrain. A free movement of 7 in. is limited by stops welded to each frame half.

TC-12 tractor is designed to provide higher power-to-weight ratios. Drawbar pull is equal to or better than current production crawlers, but at higher ground speeds.

There are two transmissions each with an integrally mounted torque converter. The transmission provides three speed ranges forward and three in reverse. All shifting is accomplished under full power. There is no master clutch. The tractor can be shifted from one speed range to the other, without loss of motion, and can be shifted into reverse while still going in the forward direction. The transmission provides adequate speed selection for all operating conditions. Top speed is 8 m.p.h.

The twin power arrangement permits a fast, flexible steering system, which increases workability. The tractor can be steered in several ways. It can be steered by increasing or decreasing the speed of one engine for gradual, even change in direction; it can be steered by putting one transmission in neutral and applying a track brake; or rapid, sharp turns under full power can be made by putting one transmission in forward and the other transmission in reverse. *Euclid Division, General Motors Corp.*

Check No. 4 On The Time-Saver Card

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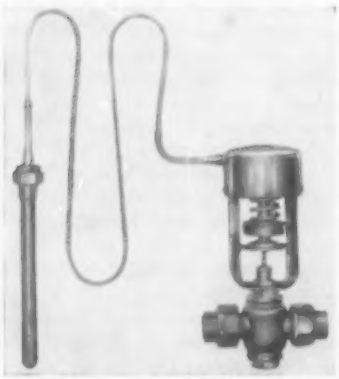

Regulator Designed For Installation Flexibility

There are at least 24,640 possible standard combinations of the No. 999 regulator to meet a wide variety of conditions. This includes combinations of available valve sizes, valve types, temperature ranges, bulb types, and materials. It does not include all possible variations of tube length nor some of the special features available, such as an indicating thermometer.

The 999 regulator is used to control temperature of internal-combustion engines, and a variety of other equipment and for industrial processes requiring accurate temperature control. The 999 regulator is self-powered, and requires no compressed air, electricity or other outside source of energy. It is simple and sturdy in design and construction. The frame is stainless steel. A large, two-ply, seamless-metal, sylphon bellows provides long life. Over-temperature protection is a standard feature. *Fulton Sylphon Division, Robertshaw-Fulton Controls Co.*

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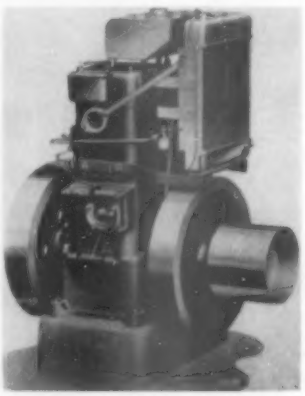

Bamfords Diesels Feature Hinged Crankcase

Featuring a hinged crankcase and a detachable governor for easy adjustment, single and twin cylinder, slow-speed Bamfords diesels from 3½ to 16 b.hp. at 600 to 700 r.p.m. are now available. The seven models in the line are of the direct-injection type, a feature which provides combustion at all loads and minimum deposit over long periods. Each model is quickly started by hand under all weather conditions. The diesels are easily coupled and require no speed-reduction unit for most driven equipment.

The hinged crankcase features easy access to working parts for inspection and maintenance without having to disturb fuel line and other vital connections. The governor is a block unit, enclosed and self-contained, which can be easily detached without disturbing other parts.

The design and slow speeds of Bamfords diesels ensure less wear on parts and lower fuel consumption per brake-horsepower-hour. Overhead exhaust and screened inlet valves, operated by a single cam, function with minimum of working parts. Main bearing and rockers in the twin models have pressure lubrication. Replacement of the cylinder unit is never necessary due to the renewable cylinder liner. *International Selling Corp.*

Check No. 6 On The Time-Saver Card

New Power Unit in the 66 to 75-Hp. Range

A new carbureted engine and power unit, designated as the U-282, will develop 66.3 hp. at 1,800 r.p.m. to 75.5 hp. at 2,400 r.p.m. for intermittent load application. Maximum net torque is 204 lb.-ft. at 1,225 r.p.m.

External dimensions of the U-282 power unit and engine are identical with the U-269 which it replaces. Changes in the crankshaft, connecting rods, pistons, crankcase, and other internal parts have been made to increase the bore ¼ in. and decrease the stroke ⅜ in. Piston displacement is 282 cu. in. While this unit is regularly equipped to burn gasoline, it will also be available with combination gas-gasoline and L.P.G. attachments to meet local requirements. Electric starting with distributor ignition is regular, but a vertical magneto can be furnished on special order. *International Harvester Co.*

Check No. 7 On The Time-Saver Card

●

Low-Frame Design On Crane Permits Use of Large Shoes

The LS-68, a light ¾-yd. shovel-crane takes the place of the LS-52, which has been in the field since 1952. The LS-68 offers all-advanced features, including Speed-o-Matic hydraulic controls.

The various features include lower frame, a large, 10-in. diameter, heat-treated forged-steel single-flange track rollers mounted on 2½-in. diameter shafts. The lower frame is designed to permit the use of 24-in. or 30-in. shoes, which provide a maximum ground bearing area of 47 sq. ft. A long, wide frame is also available, on which 36-in. shoes can be used to give a maximum ground bearing area of 63 sq. ft.

Weight of the LS-68 machine is 35,300 lb. as a standard shovel. Separated drum gears and clutch shells permit the use of alloy cast-iron clutch shells, assuring superior friction action and longer lining life. The clutch shells are bolted to the drum gears. Six conical hook rollers, two equalized pairs in front and two individually mounted in the rear, are standard on the LS-68.

This crawler-base rig is fully convertible to all standard front-end attachments with a minimum of conversion time. No major changes are necessary to the main machinery, clutches, brakes, or gears. *Link-Belt Speeder Corp.*

Check No. 8 On The Time-Saver Card

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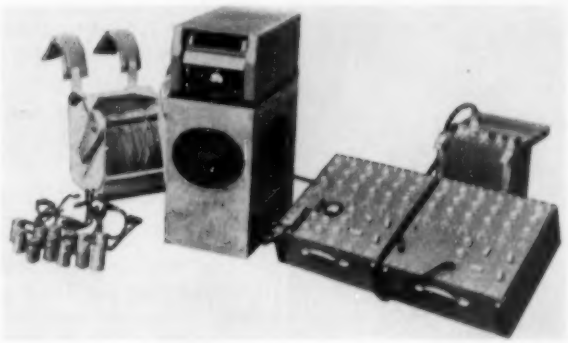

Seismograph Obtains Near-Surface Data

A high-resolution reflection-seismograph system has been designed specifically to obtain near-surface seismic data. The HTL Model HR system is designed for extremely shallow reflection work and provides seismic information in the depth range of 100 to 2,500 ft. In petroleum exploration it furnishes data for establishing near-surface velocity control, obtaining near-surface structural data, and supplementing core-hole information. It further assists in the location and delineation of dikes and other intrusives, shallow mineral beds or seams, and similar features.

The new system differs from the ordinary reflection-seismograph system principally in its higher frequency response, its higher paper speed, and its higher resolution, making it capable of accurately resolving reflections from as shallow as 100 ft.

The HR system is especially designed for utmost portability and flexibility in field use. Lightweight-unit construction, with components equipped with carrying handles or optional back-pack adapters, makes it suitable for operations in rough terrain. *Houston Technical Laboratories.*

Check No. 9 On The Time-Saver Card

●

Dura-Tape Pipeline Wrapper Made for Cold Application

Dura-Tape is a new and effective cold-application pipeline wrapper with a built-in primer. One quick application of Dura-Tape gives an electric insulator, a mechanical shield, and a chemical inhibitor. It is easy to apply by hand or by machine; is ideal for wrapping mains, service connections, and lines in utilities systems; and is holiday-free, making it an excellent transmission-line wrapper in over-the-ditch coating operations.

Dura-Tape is also suitable for wrapping field-welded joints on mill-wrapped jobs. It can be applied under any weather conditions, and two or three unskilled employes can wrap from ½ to 1 mile of pipe per day and leave it in the ditch ready for backfill. The

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primer is nondrying and Dura-Tape will stand 10,000 to 15,000 volts imposed by a holiday tester. *Dura-Tape Co.*

Check No. 10 On The Time-Saver Card

●

Willys Industrial Engines Now Packaged on Skids

The Willys power unit is fully equipped with a radiator, gas tank, air cleaner, complete electrical equipment, and governor. The enclosure is a heavy gage, steel housing designed for both rugged duty and appearance. The power unit is mounted on heavily reinforced skids.

The tough Jeep, Model L-4 (four-cylinder, L-head) is designed for the lower power ranges and develops 47.5 maximum b.hp. at 2,400 r.p.m. and 59 b.hp. at 4,000 r.p.m. In the four-cylinder class, also, is the Hurricane, Model F-4, F-head engine. This design develops 51 maximum b.hp. at 2,400 r.p.m. and 70 b.hp. at 4,000 r.p.m. In the six-cylinder class, the Lightning, Model L-6 with an L-head design is offered. Its maximum brake-horsepower is 56 at 2,400 r.p.m. and 75.5 at 4,000 r.p.m.

Also available is the Giant Hurricane,

another F-head design, Model F-6. This six-cylinder engine develops 60 maximum b.hp. at 2,400 r.p.m. and 90 at 4,200 r.p.m. An important feature of both F-heads is the torque curve which is practically constant at all speeds.

A heavy-duty, hot-climate, 11-qt. radiator and heavy-duty oil-bath air cleaner are supplied with the power unit. Many different power-transmission adaptations are available including S.A.E. flywheel housings, automotive clutch housing, and transmission, power-takeoff units. The instrument panel includes a key-ignition starter switch; choke; throttle; and ammeter, oil-pressure, and water-temperature safety-switch gages. *Willys Motors, Inc.*

Check No. 11 On The Time-Saver Card

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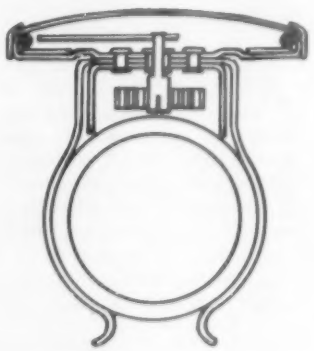


Thermometer Fastens By Means of Spring Clip

The pipe surface thermometers are used to obtain the temperature of pipes and tubes from ½ in. to 2 in. in size. The thermometer is quickly fastened to the pipe by means of a spring clip without the use of any tools. The spring is pushed over the pipe by hand and snaps into place. The temperature sensitive element is a calibrated bimetal and is closely coupled thermodynamically to the pipe. The accuracy is ± 2° over the entire range of the thermometer, which reaches stability within 5 minutes. The bimetal element is protected by a copper cup which is made to fit the pipe closely.

Pipe surface thermometers come in two ranges, one from −50° to 250° F., and the other from 70° to 370° F. The thermometer dial is 2 in. in diameter. *Pacific Transducer Corp.*

Check No. 12 On The Time-Saver Card

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Catalog No. 246 covers in detail the three standard types of convex-scale and flat-scale Truscale remote-reading gages, showing how these gages bring the liquid level down to where it can easily be seen. Included are features of design and construction; description and schematics showing operation; schematics and charts graphically illustrating the three types of datum columns to meet specific needs; and illustrations and descriptions of typical Truscale gage applications. *Jerguson Gage & Valve Co.*

Check No. 13 On The Time-Saver Card

●

Wire-Mesh Demisters is a four-page illustrated bulletin describing how wire-mesh sections improve performance and increase the throughput capacity of any process vessel handling both liquid and vapor-phase materials, contains technical information of value to engineers and purchasing agents in the chemical, petroleum, and allied fields which make use of vacuum towers, distillation equipment, flash towers, absorbers, evaporators, steam drums, gas filters, or scrubbers in processing operations. It describes how Yorkmesh DeMisters effect clean and efficient separation between vapor and liquid at high-vapor velocities. A two-color cutaway diagram explains the principles behind the operation of wire-mesh demisters. *Otto H. York Co., Inc.*

Check No. 14 On The Time-Saver Card

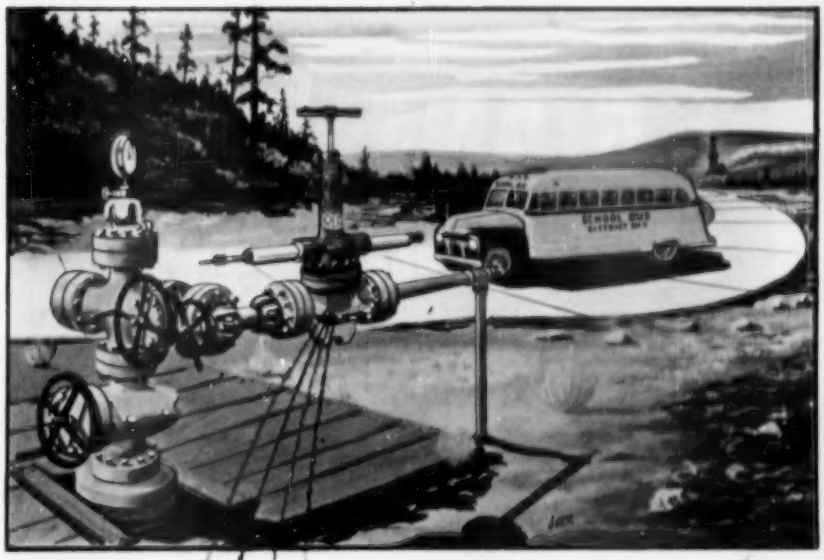
●

Gear Drives for Pipeline Service. Bulletin 5204 describes a full line of gear units for every type of pumping service. Each drive is illustrated and extensive data tables include complete engineering information. *Western Gear Works.*

Check No. 15 On The Time-Saver Card

●

General Products Catalog. A new condensed 52-page catalog describes and illustrates all of the Airco products regularly used by job shops, maintenance departments, and other users of light-welding and cutting equipment.



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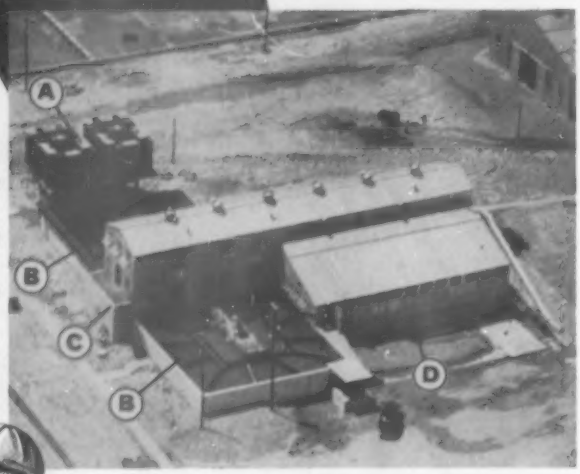

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Flooding water treatment at Salem, Illinois posed an especially difficult problem because the chemical composition of the water will change continuously. As the flood develops, more and more produced salt water will be mixed with a lesser amount of fresh makeup water to provide the necessary input volume.

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Catalog ADC 662B covers gases, welding and cutting equipment, and accessories, such as torches, tips, regulators, and electrodes. It also includes three latest developments; Aircospot (inert-gas spotwelding), Easyarc 12 electrode, and the new heavy-duty cutting attachments for Airco torches. *Air Reduction Sales Co.*

Check No. 16 On The Time-Saver Card

●

Type F Shell-and-Tube Heat Exchanger, a complete description of stock and especially engineered Type F fixed-tube bundle heat exchangers is given in the newly revised Catalog No. 1254. The 12-page 2-color catalog also contains application photographs covering a wide range of industries. It includes materials and construction features, dimension drawings, and tables. Approximately four pages of the new catalog are devoted to a simple guide to heat-exchanger selection. These data include all necessary tables and formulas for selecting exchangers involving the most common cases of water-to-water and water-to-oil heat transfer. *Young Radiator Co.*

Check No. 17 On The Time-Saver Card

●

Choosing the Right Valve, a new 20-page, 2-color, profusely illustrated pamphlet serves as a handy refresher in the application of basic valve designs for specifiers and buyers of piping equipment. It puts at the piping engineer's elbow a great variety of valve types, each with some special qualification for service. From these he may choose the right one to provide dependable and economical performance in each specific instance. *Crane Co.*

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●

Double-Volute Multistage Pumps. Cutaway illustrations and flow diagrams serve to explain the construction, function, and operation of a new line of pumps. The double-volute design insures perfect radial balance of the rotating element, which, in turn, eliminates unequal pressures on the shaft. *Bingham Pump Co.*

Check No. 19 On The Time-Saver Card

●

Gas Turbines for Pipeline Pumping is a new publication explaining the application of gas turbines for gas-pipeline pumping. The 12-page, 2-color booklet, designated GEA-5962, contains detailed information on the operation and application of gas turbines for gas pipelines. Numerous illustrations and

drawings help explain turbine uses. *General Electric Co.*

Check No. 20 On The Time-Saver Card

●

Customized Rubber Engineering, Plastic & Rubber Products Co., Los Angeles, and Parco Rubber Products Co., Houston, together announce a new informative pictorial Brochure No. 1090, describing the types of materials, methods, measurements, and specifications used by Plastic & Rubber Products and its new Houston plant in regard to hydraulic-sealing problems. *Plastic & Rubber Products Co.*

Check No. 21 On The Time-Saver Card

●

Twin Disc Model PO Air-Actuated Clutch No. 304 describes performance characteristics of the Model PO air-actuated clutch for installation on all types of equipment in the oil fields and on cranes and shovels. Features of the new Model PO, desirable in industrial clutches are: extra-high torque capacity, lighter weight, and narrower over-all width. Available are sizes 14 in. through 36 in. with torque capacities to 120,000 lb. *Twin Disc Clutch Co.*

Check No. 22 On The Time-Saver Card

●

Greenwood Vapor-Recovery Unit for loading tank cars is the subject of a single-page Catalog Sheet No. VRU-1. The conical, lightweight, aluminum housing is equipped with a sealing ring, a transparent plexiglass light well, a 2-in. connection for vapor-recovery hose, a spring-loaded cover for observation, a fill hole, and a float tube containing a float and liquid-level indicator. *Vernon Tool Co.*

Check No. 23 On The Time-Saver Card

●

Nu-Coil Type Rotating Scratcher. This perforated data sheet illustrates and lists the advantages of using strong coil springs for positive mud removal. *B. & W., Inc.*

Check No. 24 On The Time-Saver Card

●

Oil-Recovery Chemicals. An advanced and complete chemical treatment for water to be injected into oil reservoirs is the subject of an elaborate dozier just published. Subject matter includes new testing techniques, chemicals formulated for individual reservoir conditions, a great variety of well-treating compounds, and a complete engineering service. *Orchem Corp.*

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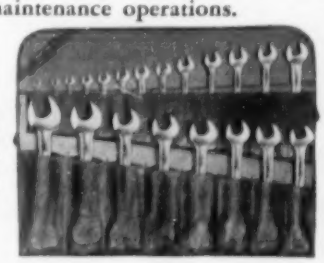

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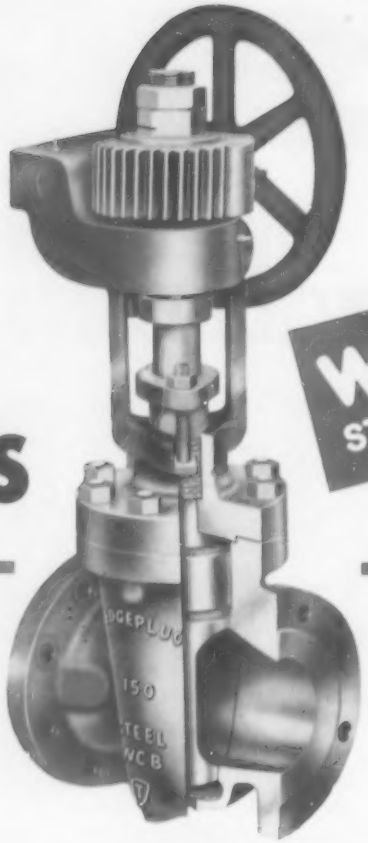

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EQUIPMENT MEN . . . in the News

Oakite Opens New Research Facilities

John A. Carter, president of Oakite, surrounded by members of the company's research and product-development staff, pulls the switch to open the firm's new laboratory facilities. Three times the size of the former quarters, the new space houses Oakite's research development, customer service, and engineering laboratories.

Oakite Products, Inc., recently opened newly expanded laboratory facilities in New York City. The new laboratory gives Oakite a completely modern, well-equipped center for carrying on chemical research development, technical service, and engineering development.

The laboratory comprises separate sections devoted to research on cleaning problems in petroleum, transportation, and other industries. Other sections are equipped for research on inorganic cleaning materials, conversion coatings, solvent-detergent developments, paint stripping, pickling, and electrocleaning.

The laboratory center also includes a complete pilot-plant department, an engineering department and testing section, and service laboratories where specific problems in cleaning equipment in the petroleum refining and other industries, are given special attention. The center is self-contained, with offices, conference rooms, a library, analytical facilities, machine shops, storerooms, an oven room, and complete photographic facilities. It will be employed to develop new and improved equipment and techniques for controlling and applying Oakite materials.

Cooper is Subdistrict Superintendent at Russell

Glen E. Cooper has been transferred to Russell, Kans., to assume responsibilities of subdistrict superintendent of the Lane-Wells Co. branch located there, it has been announced by Ed Saye, district superintendent.

Cooper has been with Lane-Wells since 1944. Prior to his appointment as subdistrict superintendent in Russell, he was in charge of the Stockton, Kans., station and before that was a perforating operator for 6 years in Great Bend, Kans.

Garlock Appoints Sewell As General Sales Manager

J. B. SEWELL

J. B. Sewell, Toronto, Canada, has been appointed general sales manager of The Garlock Packing Co., Palmyra, N. Y., according to an announcement by George L. Abbott, president.

In his new capacity Sewell will direct from Palmyra the sales of Garlock products through the company's 29 divisional offices throughout the United States and Canada.

Starting with Garlock in 1935 as salesman for the Montreal area, Sewell was appointed vice president of The Garlock Packing Co. of Canada, Ltd., in 1947.

Sewell will take over the sales duties of Louis Mohn, a vice president of the company.

Oil Well Breaks Ground For Garland Plant Extension

Executives of Oil Well Supply Division of U. S. Steel Corp., who participated in Garland ceremonies are, left to right: G. M. Amstutz, Ralph W. Rager, Fred F. Murray, D. H. Barr, and Fred Link.

Fred F. Murray, president of Oil Well Supply Division of U. S. Steel Corp., turned a spade of earth on October 1, 1954, signalizing an expansion that will more than double the size of Oilwell's central warehouse and modification center at Garland, Tex.

Murray said the present facilities had proved inadequate and that the expansion was a necessity resulting from the continuing high level and increasing needs for equipment and supplies by the southwestern oil and gas industries. The Oilwell president also said that new

merchandising plans of the division influenced the decision to enlarge the Garland operation which is located on an 83-acre tract on the western edge of the city of Garland.

The new structure will cover 90,000 sq. ft., compared with 75,000 ft. in the existing unit. It will consist of three 400-ft.-long manufacturing bays of 75-ft. width, giving the new section over-all dimensions of 400 by 225 ft.

Depending on normal construction and supply conditions, it is expected to be ready to begin operation during the fourth quarter of next year. Fred Link, facilities planning director, will supervise its construction.

Joining the present structure on the east, the new one will be a fabricated structural-steel building with protected metal roofing and siding. Six large overhead cranes, four of 20-ton capacity and two of 15-ton, will service the three bays.

Those attending the ground breaking from the Oilwell executive staff were Fred F. Murray, president; Ralph W. Rager, vice president; Fred Link, director facilities planning; G. M. Amstutz, general works manager; and D. H. Barr, general merchandise manager.

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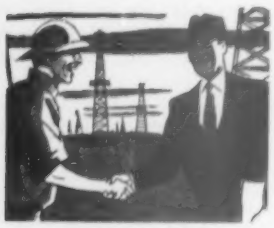

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Serre Joins Kellogg's Senior Sales Staff

R. M. SERRE

Roger Maurice Serre, of New York, has joined the staff of senior sales representatives of The M. W. Kellogg Co., one of the largest firms engaged in the design and construction of chemical plants and oil refineries. A chemical engineer, Serre has had extensive petroleum experience in Europe and South America as well as in the United States. According to R. J. Wolf, vice president, Serre will represent Kellogg in the negotiation of engineering and construction contracts in the petroleum and petrochemical fields.

Totco Announces Recent Sales Division Changes

CADWALLADER

W. Y. (Red) Cadwallader has been employed to serve Totco users in the Bakersfield-San Joaquin, Calif., areas as announced by H. H. (Pete) Peters, president, Technical Oil Tool Corp. Cadwallader joins Totco with a background of 12 years' experience with prominent oil-well-supply houses and oil-tool manufacturers. He will make his headquarters in Bakersfield.

P. Taylor Bannerman, formerly with Totco in Bakersfield, has been appointed purchasing agent at the Totco home office and plant in Los Angeles.

John Davis has been named California division manager with headquarters in Los Angeles.

Dale Ernest has been moved from Hobbs, N. M., to Pratt, Kans., to improve customer service in Kansas. Ernest will serve all of the supply stores carrying the Totco line in Kansas.

Metal Goods To Distribute Metex Mist Eliminators

B. A. Kingman, president of Metal Textile Corp., has announced the appointment of Metal Goods Corp. as distributor for Metex mist eliminators. He reports that Allen H. Whitehead of Metal Goods will be the commodity manager in charge.

Metex mist eliminators are wire-

CAN TYPE VERTICAL PUMP

Now Available in Two Types—FOR APPLICATION to CHEMICAL PROCESSING, REFINING TECHNIQUES, CONDENSATE SERVICE, AND LINE BOOSTER SERVICE

NEW DESIGNS PROVIDE BOTH A PROCESS TYPE AND A TRANSFER TYPE

The process type vertical Hydro-Line pump, especially suited to refining and process pumping offers the following features—1) API-ASME code welding; 2) especially designed containers for either mechanical shaft seals or packing; 3) availability of head and barrel flanges up to 300 lbs. or more; 4) extra heavy wall thicknesses for maximum stability and high safety factor; 5) elliptical barrel bottom design for optimum fluid entrance conditions. The transfer type Hydro-Line pump is of a similar design to the process type differing in materials of construction required for less rigorous service. Both types are extremely flexible in installation, are easy to inspect, service and maintain—can be designed for operation on any available system NPSH. Write for new Bulletin No B-1700.

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HYDRO-LINE
ENCASED CLOSE-COUPLED PUMP

CAPACITIES TO	3000 gpm
HEADS TO	1000 feet
DRIVES	As required, vertical solid shaft, or explosion-proof motors; steam turbine.
TEMPERATURES	Up to 400° F.

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Factories at: Los Angeles, Calif., and Indianapolis, Ind.
Offices: New York; Atlanta; Chicago; St. Louis; Indianapolis; Phoenix; Fresno; Los Angeles; Dallas, Plainview and Lubbock, Texas; Albuquerque, New Mexico.
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mesh separators used in the petroleum-refining and chemical-processing industries for removing liquid entrainment from gases.

In addition to representing Metal Textile as distributor, Metal Goods is a recognized distributor for Aluminum Company of America, American Brass Co., Armco Steel Corp., International Nickel Co., and others. Metal Goods maintains warehouses and offices in St. Louis, Denver, Kansas City, New Orleans, Houston, Dallas, and Tulsa. These warehouses serve a 23-state area in the Central, Central South, Southwest, and Rocky Mountain regions.

National Supply Makes Dailey Division Manager

R. L. DAILEY

Roger L. Dailey has been appointed division manager of the Eastern Division of The National Supply Co. He succeeds William Van Fleet, who will handle major accounts in the Pittsburgh area. Dailey joined National Supply in 1922 as a field salesman in Okemah, Okla. He was appointed assistant district manager of the Illinois district in 1938 and since 1944 has served as district manager of the Illinois and Michigan districts.

The Eastern Division, with headquarters at Toledo, Ohio, includes the Kentucky and West Virginia district, the New York and Pennsylvania district, and the Ohio district, as well as the Illinois and Michigan districts.

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SYSTEM CAN CUT LOSSES
Why continue to throw away profits? The Enardo Vapor Control system can cut your losses enough to pay for installation of the system as well as reconditioning all storage tanks on an average lease.
Enardo Vapor Control equipment has been field tested and proven. The hatches are of either dead weight or spring-loaded manufacture. The vent line is connected to the hatch by means of a by-pass containing an automatic check valve. When the tank hatch is opened for gauging or thiefing, it seals off the vent line, and isolates that tank from the remaining tanks in the battery, cutting vapor losses to the minimum.
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Tellepsen Names Wilde as Division Sales Manager

S. H. WILDE

The appointment of Stafford H. Wilde as division sales manager of Tellepsen Petro-Chem Constructors, a division of Tellepsen Construction Co., Houston, has been announced by Emory E. Gose, Jr., Tellepsen vice president.

From 1930 to 1945, Wilde was associated with Henry J. Kaiser Interests, during which time he was employed on such major projects as Hoover Dam, Delaware Water Aquaduct for the City of New York, and the U. S. Naval Air Station at Corpus Christi, Tex. He served as general manager on the latter project. In adidtion, he later supervised manufacturing operations for aircraft parts and shell components.

In 1945, Wilde organized Bellco Industrial Engineering Co., Houston. Until his resignation on September 1, he served as vice president and director of this organization, closely associated with the chemical and petroleum fields and responsible for a great amount of industry activity in the Gulf Coast area.

Gorman-Rupp Co. Announces Three New Representatives

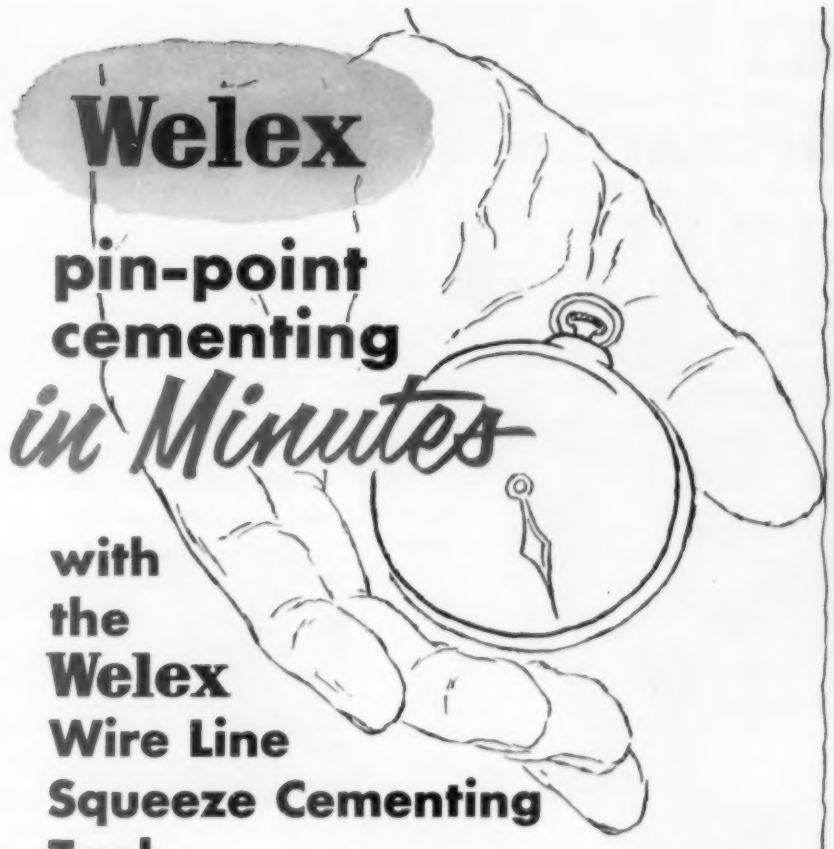
Three new district representatives have been announced by Kenneth H. Cadigan, vice president in charge of sales, Gorman-Rupp Co. Donald L. Sanders is the new representative for Ohio, West Virginia, Virginia, Pennsylvania, New York, and parts of Kentucky. Richard M. Fraser and Ted C. Bauck will represent the company in northeastern United States and the midwestern area, respectively. All three appointments are in line with Gorman-Rupp's program of expansion and close factory-dealer representation.

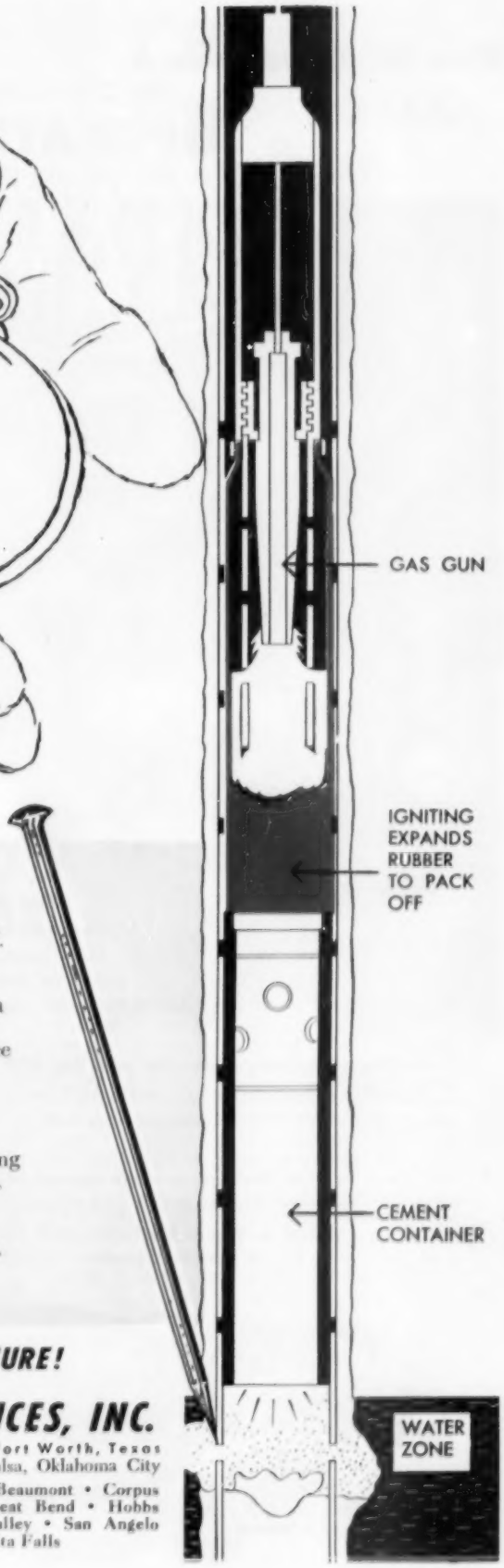
Sanders has had 8 years' shop and sales experience with pumps. He was with Forslund Pump & Machinery Co., a Gorman-Rupp distributor, 4 years in

Welex

pin-point cementing *in Minutes*

with the Welex Wire Line Squeeze Cementing Tool





For water problems . . . bottom hole water, communication between zones, water infiltration of the perforations, leaky shoes, or leaky casing, the Welex Squeeze Cementer offers the maximum in efficient shutoff.

The only cement squeeze tool which can be run on a wire line, the cement is forced into place by the firing of a high pressure gas gun which expands packer against the casing as a packoff and squeezes the cement into place under higher pressure than any surface cement pump.

The packer cannot stick. It instantly releases when the cement is ejected from the tool. Plugback depth can be controlled from a minimum of one foot. Stage cementing permits economical plugbacks up to approximately 50 feet.

You save money with the Welex Squeeze Cementer by eliminating round tripping of tubing, pump truck service, cement retainers, and by using a minimum of cement. You save by getting back in production faster.

Call Welex and be SURE!

Welex JET SERVICES, INC.

General Offices: 1400 East Berry, Fort Worth, Texas
Division Offices: Houston, Midland, Tulsa, Oklahoma City
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Killing FIRE Through Research

Fire tests like that shown above are commonplace to the specialists directing operations at "Automatic" Sprinkler's Technical Laboratory and Fire Testing Department. Determining methods to lick fire before it gains headway, is their daily task.

These engineers design fire protection BEST-BY-TEST for severely hazardous manufacturing operations. All types of extinguishing mediums are at their disposal—every known method of fire detection is employed.

The services of this research phase of our business are available to our customers and potential customers. It's a service second to none in our field—lends credence to the motto . . . "Automatic" Sprinkler—FIRST IN FIRE PROTECTION!

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CORPORATION OF AMERICA
YOUNGSTOWN, OHIO

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sales and application. The past 2 years, Sanders has been with Clayton Manufacturing, manufacturers of steam generators.

Fraser has had 15 years' experience in pump sales. This experience was obtained with Marlow Pumps, Division of Bell & Gossett; Yale & Towne Pumps; and 2 years selling petroleum equipment in Boston.

Bauck has been associated with Goulds Pump, Inc., and Marlow Pumps, Division of Bell & Gossett. He was a sales engineer for both concerns. Also, Bauck has had 3 years' experience in the Gorman-Rupp organization as a sales engineer and manager of industrial sales.

Coberly Announces New Kobe, Inc., Promotions

Principals involved in the recent series of promotions at Kobe are from left to right: R. G. Ralph, hydraulic service manager; W. F. (Pete) Slater, general sales manager; and Ray Elner, hydraulic sales manager.

W. F. (Pete) Slater has been named general sales manager of Kobe, Inc., according to a recent announcement by C. J. Coberly, president of the company. Other promotions announced were: R. G. Ralph, named hydraulic service manager; Ray Elner, hydraulic sales manager; and J. T. Lewis, southern division sales manager.

In his new post Slater will be responsible for hydraulic sales, hydraulic service, pipe-processing sales, industrial and export sales, and the Oklahoma City plant.

Ralph will head service and field-shop operations, as well as the field-testing phase of the company's extensive product-research and development program.

Elner has been transferred from Fort Worth, Tex., where he was southern division sales manager, to Huntington Park, Calif., and will have over-all charge of the sales of Kobe hydraulic-pumping equipment.

Lewis, formerly West Texas district sales manager at Midland, Tex., has been moved to Fort Worth where he will be southern division sales manager. S. S. McDonnold will take over the post in Midland vacated by Lewis.

Shown above, at the world's deepest well, is L.W. Potter and one of his radio-controlled Thompson Unitized Vacuum Tanks which hauled and cleaned up all fluids used on the site.

- ☐ Transfer rotary mud
- ☐ Remove brine
- ☐ Clean Tanks
- ☐ Transfer acid, acid sludge, caustics
- ☐ Drain sumps
- ☐ Oil roads
- ☐ Clean spills, leaks
- ☐ Haul slush and water

SOLE LICENSEE TO MANUFACTURE VACUUM TANKS
UNDER U.S. PATENT NO. 2522077

Dependable THOMPSON *unitized* VACUUM TANKS

Here's what L. W. Potter, vacuum-service operator of Kern County says: "Every driller wants dependable crews and equipment. That's why we're proud to have been chosen to handle all the drilling mud and liquids in the record depth achievement at Paloma Field, California. It took 668 days to reach 20,522 feet, and our fleet of Thompson Unitized Vacuum Tanks never missed an assignment!"

Thompson UVT are complete, independent units, rugged-built to handle any liquid or semi-solid. Fast, Cheap, Dependable!

Tank capacities range from 20-100 bbl., skid, truck, semi-trailer or trailer-mounted. Cost is about what you'd expect to pay for a good new car.

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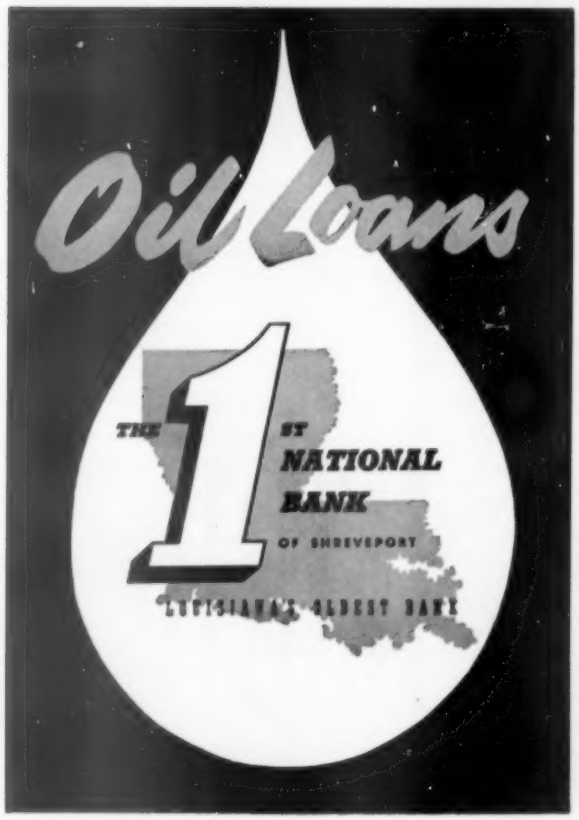
Write today for complete specifications.



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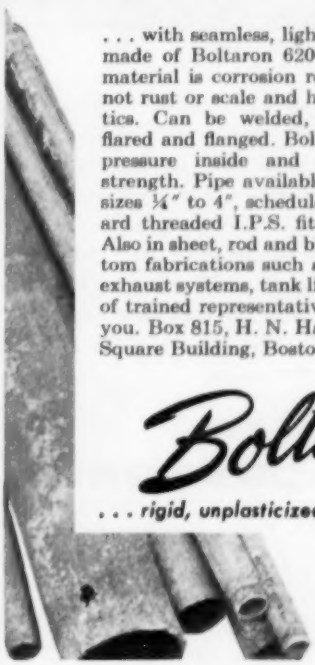

. . . with seamless, lightweight pipe and fittings made of Boltaron 6200. This highly workable material is corrosion resistant throughout, will not rust or scale and has high flow characteristics. Can be welded, bent, sawed, threaded, flared and flanged. Boltaron withstands normal pressure inside and out, has good impact strength. Pipe available in 10′ and 20′ lengths, sizes ¼″ to 4″, schedule 40 and 80 wall. Standard threaded I.P.S. fittings in sizes ¼″ to 2″. Also in sheet, rod and block stock for special custom fabrications such as ducts, ventilating and exhaust systems, tank liners, etc. Write for name of trained representative and fabricator nearest you. Box 815, H. N. Hartwell & Son, Inc., Park Square Building, Boston, Massachusetts.

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6200
. . . rigid, unplasticized Polyvinyl Chloride

For **EXTRA SHOCK-RESISTANCE** ask about Boltaron 7200 *Greenline*

... now comes the BIG QUESTION

You've reached potential pay and cored the section. Now comes the big question – *pay out or play out?* . . . After thousands of dollars and months of effort have been spent to accumulate acreage, drill an exploratory well, and core a probable productive formation, sound business practice demands *good core analyses* . . . and the reliability of these data can be assured by the experience and technical background of the organization performing the work . . . If your best efforts deserve the best possible answer, take advantage of Core Lab's eighteen years' experience in all active areas.

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PETROLEUM RESERVOIR ENGINEERING

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EXPLORATION

Mystery in Carter County

by Frank J. Gardner

OKLAHOMA has an unusual oil field. It's not an important oil field, but by its very existence, it has confounded the thoughts of a lot of geologists, and by the same token, has stimulated some constructive thinking. It is not the only one of its type, but it's one of few, and all of the few are mysterious.

This is no new discovery. It was found in 1939 when Pure Oil Co. completed its 1 Noble, pumping 140 bbl. of oil daily from the Woodford (Mississippian) shale at 4,454 ft., after finding the Arbuckle dry at 8,500 ft. The well was located on the Caddo anticline in Carter County just northwest of Ardmore, and its completion as a discovery caused no excitement at the time.

The field has been slow to develop; after 15 years, only nine Woodford producers have been completed, and most of these were finished only recently. The original discovery well has held up exceedingly well, and is still pumping after accounting for 130,000 bbl. of oil.

At first, wells drilled on the top of the Caddo anticline tested gas in the Woodford; then, as down-structure drilling ensued, oil was found. No water table has yet been encountered, and it is likely that none will be, for this is fractured-shale production, and such reservoirs often are water-barren. As a result, operators in the field can anticipate many more Woodford oilers.

Source rocks as reservoirs . . . Now, according to the best geological theory, shales are source rocks, not reservoirs. You just don't find oil pools in shales.

But we do. Fractured Pierre shales produced oil as early as 1886 at Florence and Canon City fields in Colorado. Later, shale reservoirs were found at Rangely and in at least three fields on the western side of San Joaquin Valley, California. Fissured shales produce at Salt Creek, Wyoming, and fractured shales and cherts provide the oil at California's Santa Maria fields. There may be others, but the fact remains that such occurrences are rare indeed, and Caddo is the singular example in the Mid-Continent area.

An interesting comparison . . . There is further interest in the basic similarities between the shale fields. A comparison of the old Florence field and Caddo field is striking in this respect. In both, the reservoirs is a fractured brittle shale. Both lie in areas of faulting and intense folding. Both are water-free. In both fields, wells have held up unusually well, and produced consistently for decades. Reservoir studies of both fields indicate that the oil is indigenous to the reservoir shale.

Indigenous origin vs. migration . . . While the Woodford is an increasingly important source of oil at Caddo, the main producing zones are Goddard (lower Springer-Pennsylvanian) and Hunton Devonian in age. These reservoirs were discovered in 1952 at the north end of the anticline. In an attempt to prove to themselves that the Woodford oil migrated upward from the Hunton reservoir, Carter County geologists have made extensive tests of the oil characteristics and found them to coincide very closely.

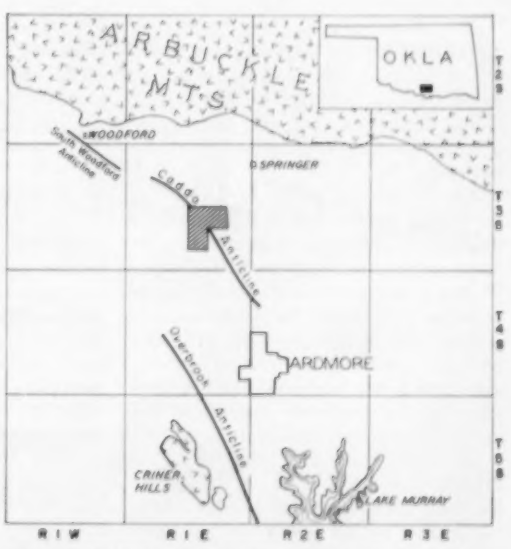
But three important deterrents would seem to condemn the premise of upward migration. These are: (1) the dead oil and the gas seeps found in the black bituminous Woodford at its outcrop in the Arbuckle Mountains to the north, (2) the presence of a green waxy shale seal lying between the Hunton and the Woodford, and (3) the fact that oil occupies only the top 100 to 150 ft. of the 350-ft. Woodford section.

The logical conclusion is that the Woodford oil is indigenous. At Florence field, this was the final conclusion: ". . . the oil is indigenous to the Pierre shale, through which it is disseminated, accumulating in pools only as the fissures are formed." (DeFord, 1927). Whether the accumulation at Caddo is as recent as that at Florence is doubtful, but obviously the conditions must have been quite similar.

Are there others? . . . Going further, it would seem likely that on many other tightly folded structures like the Caddo anticline, Woodford oil pools might be developed. The puzzling task of interpretation of the formation on electric logs, the difficulty of detecting staining in it, and a lack of sufficient drill-stem testing on the Woodford section may have deprived many areas in the Mid-Continent of possible oil fields.

Geologists are not dogmatic in their doubts about shale-reservoir fields, but they are mystified about their origin and growth. A mystery is something of which we know that it **is**, though we do not know **why** it is.

Geologists cannot always explain, but can often only state that something is . . . which is about all we can do with a large proportion of the facts and truths that we know.



Caddo field, Carter County, Oklahoma, is the scene of unusual Woodford oil accumulation.

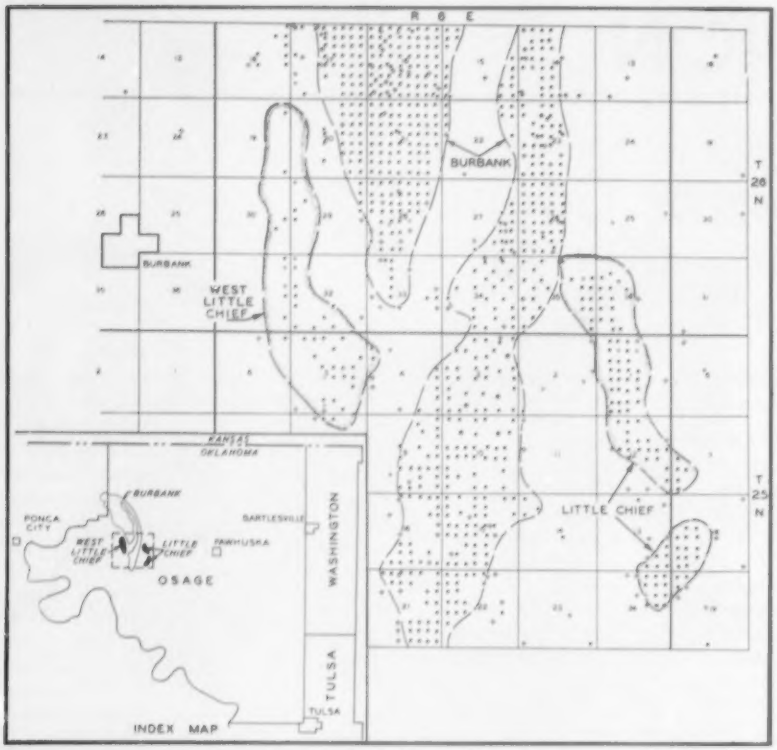


Fig. 1—Sand production on the flanks of the old Burbank field has stepped up Osage County drilling. At Little Chief the sand pinches out east and west of production, forming elongate bars. (Base map courtesy Herndon Map Service).

Lease play quickens in Little Chief area as

Shallow Pay Spurs Osage Drilling

by Norman S. Morrisey
Drilling-Development Editor

BURBANK sand production at 2,800 ft. in the Little Chief areas on the south end of the old Burbank pool, Osage County, Oklahoma, has ignited a hot lease play and an active drilling campaign.

All the mineral rights are owned by the Osage Indians and oral competitive bidding is the only way to acquire leases on Indian land in "the Osage." During a recent sale at Pawhuska, operators paid $217,000 for leases on one section with a top price of $525 per acre on one 160-acre tract. These Indian leases are burdened with a one-sixth royalty payment instead of the usual one-eighth.

Prolific production . . . Main reason for the high prices is the present Burbank sand production of Little Chief and West Little Chief pools where development drilling is still under way (Fig. 1). Little Chief, discovered in 1952 by Sunray Oil Corp., has produced almost a million barrels of oil. During June, daily average production from this field was 1,600 bbl. from 92 wells. Here the Burbank sand ranges in thickness from near zero to about 70 ft. with an average net sand thickness of 20 ft.

The pay zone at West Little Chief is thicker and the sand is cleaner; several wells have logged over 40 ft. of MicroLog pay. Since the field has not been defined as yet, operators are watching each field well closely in an effort to map the elusive Burbank sand. At the present time, both fields are held to a daily allowable of only 15 bbl. per well. Operators are confident that the fields can easily exceed the present output since most wells are completed flowing. Initial potentials of over 50 bbl. per hour are common.

Recoveries . . . Sand conditions at Little Chief and West Little Chief are very similar to those in the Burbank and South Burbank area where the same zone has produced over 250 million barrels of oil since its discovery in May 1920. Burbank is an excellent example of the stratigraphic accumulation of oil since the sand shales out along the east flank of the field.

At Little Chief there are approximately 1,440 acres potentially productive with an ultimate recovery of about 3,500 bbl. per acre. Production at West Little Chief probably will exceed these figures as the sand has a higher porosity and the average sand thickness may exceed 30 ft. Primary recovery estimates of 6,000-10,000 bbl. per acre has been made for West Little Chief, based upon core analyses.

Geology . . . Sand development rather than structure accounts for the Burbank oil in the Little Chief fields. The sand is part of the Cherokee group (Des Moinesian) and pinches out east and west of the producing area. Limited evidence indicates that the sand body at Little Chief may be connected to the main Burbank pool.

At West Little Chief, field development has not reached the point where it is possible to define the trend. As a consequence it is difficult to determine the factors controlling production.

Regionally, the fields lie on a monocline that has a west dip of about 80 ft. to the mile. Structural contour maps of the field are of little value as they fail to depict the sand thickness nor do they show the trends. Geologists and engineers put isopach maps to excellent use in staking new locations and in attempting to extend the producing area.

Little Chief is 4½ miles long, but only ½ mile wide. Its shape suggests that it may have been either an offshore bar or an old river channel, more probably the former (Fig. 2).

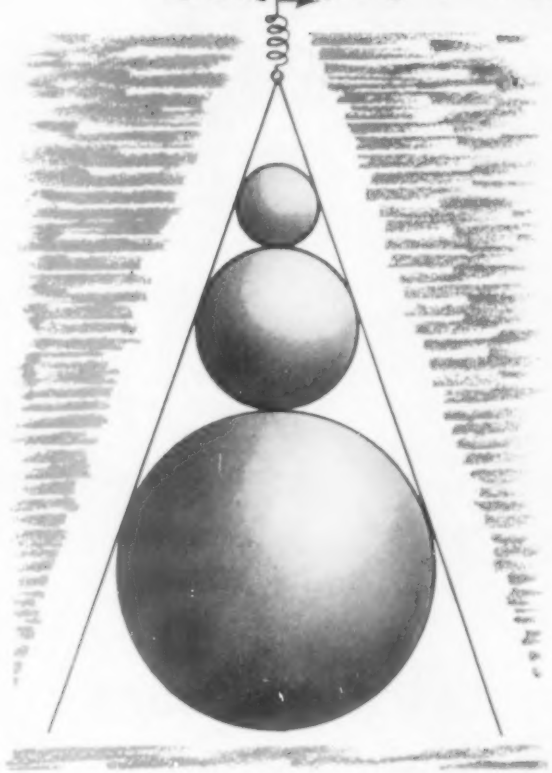
Well costs . . . Contractors drill the Little Chief wells for $3.18 per foot with day work at $514 per day with drill pipe and $482 without. Mud bills average about $325 per well.

A producer on the pump costs about $30,000 and a dry hole can be drilled for less than $15,000. Operators consider that at least 10 ft. of MicroLog pay is needed to make a commercial well on 10-acre spacing.

Drilling and completion . . . Fast, easy drilling at Little Chief enables operators to complete wells in 10 days. Contractors use light rotaries capable of going to 3,000 to 5,000 ft. for the Osage County drilling. Table 1 sum-

NO. 1
OF A SERIES

Basic Fundamentals of GRAVITY Prospecting for Petroleum



These spheres have equal gravitational attraction at the apex of the cone.

The gravity method of petroleum prospecting consists in measuring differences in the force of attraction between a small mass in the gravimeter and the earth.

All material around the instrument contributes some part of the force, each particle according to its' mass and position. This force is directly proportional to the density and to the dimension of the particle, and inversely proportional to the square of its distance from the meter. The force of gravity also varies with the angular position of the contributing mass, with respect to the plumb-line at the gravimeter.

Doubling the mass particle doubles the force of attraction; doubling the distance reduces the attraction by four; and a particle directly below the instrument contributes more force than one offside.

The observed differences in gravity are very, very small quantities — nevertheless, they are measurable with high accuracy by the extremely sensitive spring-balance gravimeters in common use.

Gravity differences are due to a number of factors such as those of latitude, elevation, topography and subsurface geology. All not due to geology can be computed and removed from the observed gravity data. Those remaining, known as the geologic anomalies, provide clues to the nature of the earth's crust.

Since this crust is made up of rocks of different densities and positions, the geologic gravity-anomaly is a very useful tool for predicting structural relationships.

SSC offers gravity surveys to its clients as part of a complete exploration service. Its gravity division, using effective instrumentation, is staffed with competent and experienced personnel, and is supervised to the end that;

Field operations must be conducted to SSC's high standards, and —

data is prepared by sound analytical methods*, and interpreted by techniques based on the logical correlation of gravity data with geology.

**SSC's electronic computing facilities are available for gravity analysis*

SEISMIC SURVEYS — GRAVITY SURVEYS — PILOT CREWS — LORAC — VELOCITY LOGGING

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WORLD-WIDE EXPERIENCE

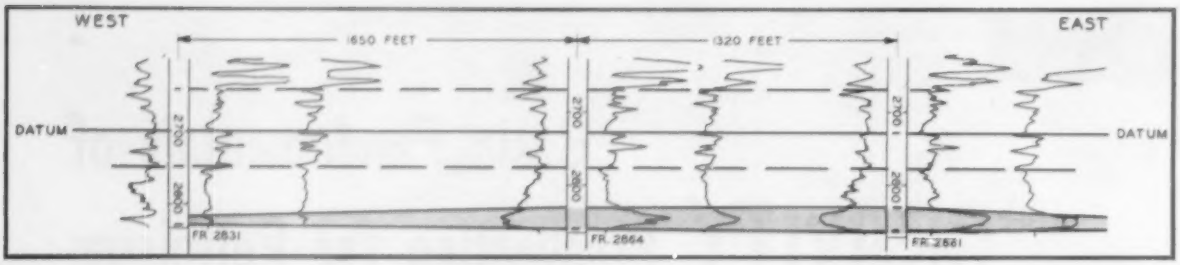

Fig. 2—East-west cross-section through the East Little Chief area shows how the sand interval changes to a shale. The well-developed Burbank sand is not reflected in the overlying beds.

marizes the typical drilling and casing program as well as the equipment used.

At East Little Chief, operators drill to the top of the Burbank, run the oil string, and complete the well in the open hole. Usual practice is to drill through the pay sand, fracture with sand oil, and complete the well flowing. At West Little Chief, the wells are completed natural with initial potentials of 20 to 75 bbl. of oil per hour either through perforations or in the open hole.

Relatively few drilling problems exist at Little Chief as the Osage is a low-pressure area where drilling has now become fairly routine.

In parts of West Little Chief, operators increase the mud weight to 12.2 lb. per gallon because the bottom-hole pressures exceed 1,700 psi. in the Burbank sand at 2,900 ft. Large volumes of lost-circulation material are added to the mud to prevent loss to the upper formations.

Kewanee Oil Co., Sunray Oil Corp., A. G. Oliphant, and The Texas Co. are active in the Little Chief play. Several contractors keep rigs busy developing this trend; among them are: Service Drilling Co., Corbett Drilling Co., F. A. Gillespie & Sons, Falcon Seaboard Drilling Co., Gross Drilling Co., and Doak Drilling Co.

Stratigraphy key to production . . . Pennsylvanian sands in northeastern Oklahoma and eastern Kansas have produced 3 billion barrels of oil. Seventy-five per cent of this oil has come from stratigraphic traps such as Burbank, Glenn, and the newer fields like Little Chief and West Little Chief.

Structural maps serve as a guide to the regional geology but fail to show the stratigraphic traps that are increasing in importance to the oil industry. Isopach maps, net-sand-thickness maps, and isopotential maps serve a useful purpose in finding and developing these rich pay zones.

TABLE 1
Drilling Data—Little Chief Area, Osage County, Oklahoma

Pay zone	Burbank sand
TD (avg.)	2,900 ft.
Normal Rig-Time Distribution	
Days on footage rate	9.5
Days on day-work rate	1.0
Total days (spud to rig release)	10.5
Bit Data	
Total number of bits	8
Feet per bit	360

Typical Equipment

Derrick: 97-ft. cantilever mast.
Draw works: U-34.
Motors (No., hp.): One at 200 hp.
Pumps: One 7¼ by 12-in. powered by two 200-hp. engines.
Fuel: Natural gas or butane.
Water supply: Ponds.
Nearest supply center: Shidler.

Casing Program

	O.d. (in.)	Casing seat (ft.)
Surface	10¾	120
Oil string	7	2,890

Geological Data

Formation tops—	Depth (ft.)
Big lime	2,550
Oswego	2,670
Pink lime	2,850
Burbank sand	2,880

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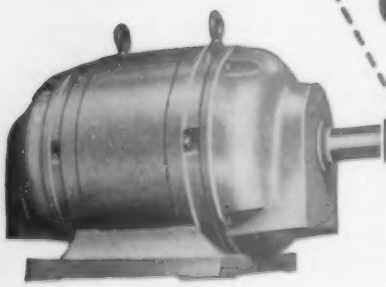
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MICHIGAN

Union Development Co. was testing a Richfield wildcat oil test in Prosper Dundee pool, Aetna Township, Missaukee County, which, at this writing, appears destined to be Michigan's newest Richfield oil discovery well.

The Union Development Co. 1 Merrill-Palmer School, S½ NW SE 35-22n-6w, was showing for about 60 bbl. of oil a day from the Richfield after acidization with 4,000 gal. Well flowed about 90 bbl., 82 bbl., 65 bbl., 32 bbl. and 40 bbl. on successive

The World's Largest Loading Pier

THIS PIER AT KUWAIT is unique. It is the largest loading pier of its kind in the world.

Now the pier has grown once more. Submarine lines have been laid to three new buoy berths, making it possible for up to thirteen tankers to load simultaneously. During a recent month 253 oil cargoes were loaded—a record figure ; and the average stay for each tanker is now only 18 hours.

Behind this latest extension lies a story of rapidly increasing crude oil production. Last year Anglo-Iranian's offtake from the Kuwait fields amounted to 466,320 barrels per day compared with 396,400 barrels per day in 1952. Thirteen producing wells were completed during the year at Magwa, a northerly extension of the Burgan field.

Throughput at Anglo-Iranian's twelve refineries in 1953 was 400,000 barrels per day. With the commissioning of Aden and Kwinana Refineries and the expansion at others, total capacity by the end of 1955 should be some 600,000 barrels per day.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company
LIMITED

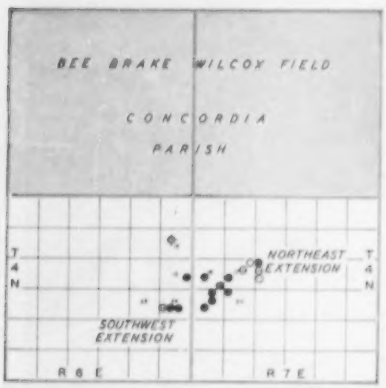
days of testing. This new Richfield prospect has been under test, and delayed with faulty 5-in. casing and casing seat since early July. Operators estimate that well should be good for about 60 bbl. of oil a day when best flow rate has been established. Well was drilled to 5,254 ft., total depth. Pay from 5,128 to 5,143 ft. was perforated and acidized.

LOUISIANA

NORTH LOUISIANA

Concordia's Bee Brake Activity On the Increase

Drilling activity in Bee Brake field, Concordia Parish Wilcox producing area in east-central Louisiana, is on the upturn following successful south-southwest and northeast extensions.



David Crow, Trustee 1 Quinn, NW SE 24-4n-6e, flowed Wilcox oil from perforations at 6,721-24 ft. The A-1 Quinn, NE SW 24, a reworked hole, will be placed on the pump. Drilling is under way at the 6,800-ft. B-1 Quinn currently in S½ NW SW 24.

E. C. Wentworth and Como Drilling Co. 1 Crothers, northeast extension to Bee Brake, C NW NW 16-4n-7e, is shut in as an oil well. Hunt Oil Co. and associates are getting ready for operations at C-16 Angelina, west offset to northeast extension to production in C NE NE 17, a 7,000-ft. Wilcox wildcat.

Wentworth and Como 2 Crothers, C SW NW 16-4n-7e, will begin soon as the south offset to the northeast extension success.

SOUTH LOUISIANA

Far-Offshore Field Adds Two More Producing Pays

Two additional oil sands have been opened for production in Eugene Island Block 126 field, 30 miles off the coast of St. Mary Parish in the Gulf of Mexico, with the dual completion by Magnolia Petroleum Co. of its 1-H State Lease 691. Both sands are above the field's previous shallowest production around 6,500 ft.

The new well is on the north side of the field, in Block 119. From its lower sand, at 5,918-30 ft., production was gaged at 270 bbl. of 37.3°-gravity oil per day through 11/64-in. choke. Tubing pressure was 870 psi. with gas-oil ratio at 461 cu. ft. per barrel.

Production of the shallower sand, at 5,600-20 ft., was at the rate of 145 bbl. of 35°-gravity oil per day through 12/64-in. choke, with pressure of 410 psi. and gas-oil ratio of 490 cu. ft. per barrel.

Church Point Production Extended to Lower Level

Tide Water Associated Oil Co. is opening another gas-condensate reservoir in Church Point field, Acadia Parish. The reservoir, perforated at 12,408-14 ft., is more than 600 ft. below the previous deepest productive zone.

The discovery well, 1 T. R. Daigle, in 83-8s-2e, produced at the rate of 3,000,000 cu. ft. of gas per day through 10/64-in. choke, and yielded approximately 40 bbl. of 50.7°-gravity condensate per 1,000,000 cu. ft. Its flowing pressure was 5,400 psi. Shut-in, the pressure was 6,200 ft.

The hole, drilled to 14,016 ft., also is the deepest in the field. Location is near Tide Water's 1 Comeaux, previous deepest producer.

KANSAS

Southeastern Ellis County Gets New Arbuckle Pool

Transit Corp. and Davis Bros. have opened a new Arbuckle producing area in the southeastern section of Ellis County, 1 mile south of Younger pool.

The 1 Lang "T," NE SE NW 8-14s-17w, 4 miles southeast of the town of Hays, is going on the pump after swabbing 4 bbl. of oil per hour for 11 hours after acidization. Production is from open hole at 3,547-53 ft.

Flowing Mississippian Well In Barber Continues Tests

Testing is still under way at a flowing Mississippian oil discovery well just 2 miles north of Oklahoma in southern Barber County.

The previously-indicated gas discovery, The Chicago Corp. 1 Davis Ranch, C NE NE 11-35s-15w, flowed 43½ bbl. of oil in 13 hours on ⅜-in. choke from Mississippian perforations at 4,982-5,003 ft. The wildcat is 4½ miles south of Aetna gas pool.

New Discoveries Listed

Potentials are reported on nine new oil and gas strikes in six Kansas counties. Barber County leads with three new pool openers.

Harms-Burt Drilling Co. 1 Smith, NW NW NW 11-32s-12w, was finaled flowing 93 bbl. of Mississippian oil per day. Purcell-Mull Drilling Co. 1 Pearl Lake, NW SW NW 12-32s-14w, gaged 10,000 M.c.f. of gas per day from the Douglas sand to open a new gas field. Barbara Oil Co. and R. C. Patton 1 McClure, SW SW SW 6-33s-11w, got 3,300 M.c.f. of gas per day from the Douglas to open another Barber gas field.

Graham County has a new pool at National Cooperative Refinery Association's 2 Van-Loenen, NE NE NE 14-9s-22w. Pump potential was 114 bbl. daily from the Arbuckle.

A new oil discovery in southwestern Kansas is complete at the Ohio Oil Co. 1 Bond, NW NW SE 32-33s-30w. Pump potential was 129 bbl. per day from the Lansing.

Two new pools are opened in Pawnee County. Knight and NCRA 1 Hutchinson estate, NW NW NW 3-23s-17w, is a new Mississippian discovery, flowing 1,413 bbl. of oil daily. Atlantic Refining Co. 1 Smith, NW NW SW 3-23s-15w, pumped 196 bbl. of Simpson oil per day.

In Rooks County Harold Patton 1 Fike, NW NW SE 5-9s-17w, has a pump potential of 203 bbl. daily from the Arbuckle lime. Trego County has a new Marmaton pool at Stanolind Oil & Gas Co. 1 Scott, NW SW SW 16-11s-22w. Pump potential is 39 bbl. daily.

HUGOTON EMBAYMENT

Lansing Shows Reported At Scott County Wildcat

A lease play has been fired in the area around 10-19s-31w, Scott County, Kansas, as a result of reported Lansing oil shows at a wildcat 4 miles south of Grigsby and 4½ miles southeast of Keystone field.

W. L. Hartman 1 Rush has not confirmed the showings. Reports have it that the operator is drilling at 4,804 ft. toward the 5,100-ft. Arbuckle objective. Lansing top is 3,940 ft.

New Morrow Discovery Is Assured in Beaver County

United Producing Co. 1 Evans, NE SW 8-5n-25eCM, 7½ miles northwest of Northwest Knowles field, is an assured Morrow sand discovery for Beaver County after flowing 7,800 M.c.f. of gas per day.

Greenwood Gets Its Third Oil Well

Morton County and Greenwood gas field have their third oil well at J. M. Huber Corp. 3 U.S.A. "C," NE SW 29-34s-43w.

The big well flowed 464 bbl. of oil daily. Bomb-test potential was 972 bbl. per day. The natural flow is from perforations in the Morrow sand at 4,186198 ft. Stanolind Oil & Gas Co. 1 U.S.A. "C," C SW 29, pumped 252 bbl. of oil per day from the Morrow several months ago to open first oil production for the big Topeka lime gas field and for Morton County.

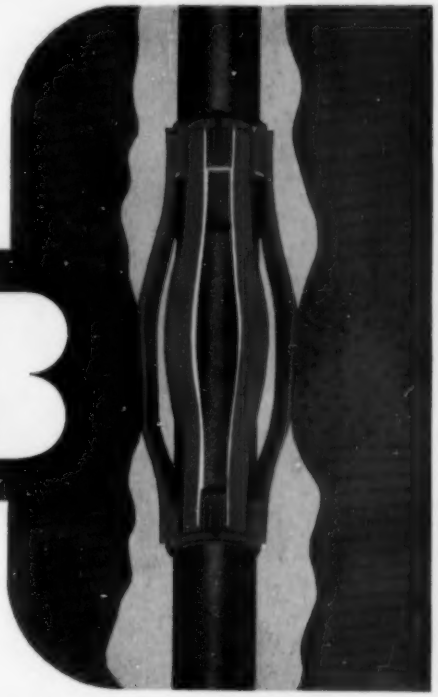
New gas pays indicated . . . Greenwood field has new gas pays indicated at two geological wildcats.

Colorado Oil & Gas Co. 1 Levens, C NW 9-32s-42w, has indicated gas production from an unidentified Pennsylvanian lime at 2,799-2,875 ft. Flow was at maximum rate of 2,500 M.c.f. per day. Regular gas pay in the field is 3,152-3,202 ft.

The other new-pay prospect is the 1-11 Saunders, SE SE 11-32s-43w, 4 miles west of the 1 Levens well. It flowed 185 M.c.f. of gas per day on 1½-hour test at 4,136-60 ft.

CUTS TORQUE ON ROTATING CASING

HALLIBURTON'S S-3 CASING CENTRALIZER



Reducing torque on rotating casing to safe limits is another important job of Halliburton's S-3 Casing Centralizers. The same centering force of the S-3 that means more uniform cementing and maximum casing protection also reduces sidewall contact and the friction that means dangerously high torque loads.

Rugged tests proved that the more positive centering force of the S-3 was the one way to effectively reduce strain on casing—*even when running through key seats, tight hole and extreme deviation.*

The stronger springs of special steel never touch casing nor permit casing to be jammed against damaging sidewall. These heavier springs demonstrated their ability to take tremendous pressures over and over again and still lose as little as 3.94% in bowed height—considerably less than ordinary centralizers. This centering force is proved in the well by providing stronger, more uniform cementing, better casing protection all the way down hole and still keeping torque less than on so-called "free hanging" casing.

Since each S-3 Centralizer can do more, it means you can use fewer units and still get more positive centering force. That means extra benefits in freer annulus circulation, faster installation and overall economy. With all these proved advantages, you can't go wrong by specifying the S-3 Casing Centralizer. And you can't do better—at any price! Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

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Dependable S&J SWING LINE ASSEMBLY

Fig. ST-235

Swing line equipment for petroleum storage tanks can only be as efficient and dependable in operation as its design and manufacture make it. You can be assured that Shand & Jurs Swing Line assemblies possess that top notch QUALITY that set them head and shoulders above the rest. Consider these features of S&J's Swing Line Assemblies that provide long life operation and greater dependability under all weather and operating conditions:

The S&J Double Elbow Swing Joint, Fig. ST-235, is designed for mounting on the tank shell only. Settling or shifting of the tank bottom cannot affect its free and easy swing. The two elbows are held together by a spring loaded rod and tension can be adjusted. The swivel elbow is supported by a thrust bearing which is tied to the tank shell by telescoping supports that facilitate installation. Telescoping supports are supplied only when specified.

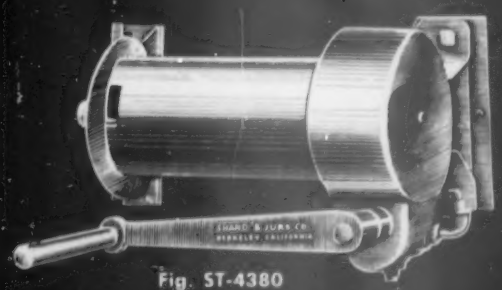

Fig. ST-4380

The S&J Cable Winch, Fig. ST-4380, utilizes machine cut, anti back-lash gears which run in an oil bath. The handle is designed to provide maximum mechanical advantage with minimum effort.

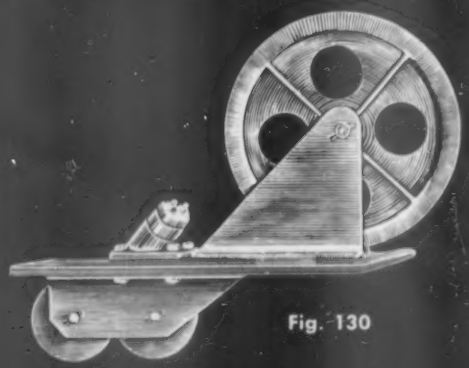

Fig. 130

The design of the S&J Cable Sheave Bracket, Fig. 130, assures proper alignment of the plow steel cable passing through the tank roof and over the exterior sheave. Also available are S&J Gas Tight Cable Sheave Cases which provide an oil seal for moderate tank pressures.

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ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
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It also flowed 210 M.c.f. at 4,766-88 ft. The tests were in the Marmaton and Purdy sand, respectively.

Beaver Outpost Awaits Potential North of Greenough

J. M. Huber Corp. 1 Davis, NE SW 30-6n-22eCM, 1 mile north of Morrow production and 2½ miles north of Mississippian Greenough field production, has assured pay in both formations.

The operator is awaiting potential on the discovery after it flowed 7,870 M.c.f. per day from 6,291-6,301 ft. after acidization and 35 bbl. of distillate in 6 hours on 1-in. choke from Morrow at 6,117-29 ft.

Deep Quinduno Flank Test Reports Free Oil Recovered

Free oil has been recovered at a deep wildcat test on Quinduno field's south flank in Roberts County.

Phillips Petroleum Co. 2 Gay Estate, 8 miles west of Miami and 3½ miles southeast of the big field's only deep production, recovered 120 ft. of free oil on a 1-hour drill-stem test at 6,114-28 ft.

Hansford County . . . Sharples Oil Corp. 1 Henderson, 6 miles northeast of Gruver and 2 miles north of Gruver-Pennsylvanian field in Hansford County, has assured gas production after a successful Cherokee drill-stem test at 6,240-75 ft. The well made 5,690 M.c.f. of gas per day and recovered 15 ft. of distillate.

Open flow potential has been taken at Stanolind Oil & Gas Co.'s 1-mile outpost to Fulton 1 Matthews Morrow gas discovery in the east-central part of the county. The 1 Matthews flowed 3,469 M.c.f. of gas per day from Morrow at 7,076-7,382 ft. The discovery is shut in.

Panhandle Discoveries Finaled in Two Counties

The first oil producer in Hartley County has been officially completed. Standard Oil Co. of Texas 1 Ernest Guilloud, Sr., which opens Dalhart basin to oil, pumped 38 bbl. of oil per day from Pennsylvanian granite wash perforations at 6,164-86 ft.

Potential test has been run at Phillips Petroleum Co. 1 Kathryn "B," southeastern Sherman County discovery. The strike flowed 50 bbl. of oil and 40 bbl. of water per day on ½-in. choke from Pennsylvanian lime at 5,382-96 ft. The discovery opens deep oil production in the Hugoton field area. It is located 7 miles northwest of 1 Kathryn "A," a Pennsylvanian gas discovery.

ARKANSAS

September Activity Nets New Pays and Extension

A major extension and three new oil pays were established in Arkansas fields during September.

The extension discovery was 1⅛ miles northeast of Kiblah field in Lafayette County in the southwestern part of the state. It was Arthur Richenthal 1 Moore, C SW NW 2-20s-26w, 7½ miles southwest of Bradley. The discovery flowed 200 bbl. of oil daily through ¼-in. choke from perforations at

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BARTLESVILLE, OKLAHOMA

6,001-06 ft. in the Mitchell sand of the Rodessa. A north offset to the extension strike is now under way.

A former Smackover well in Village field, Columbia County, was reworked by J. B. Downs who came up with a new Travis Peak sand producer for that field. The 1 Farris, C SE SE 16-17s-19w, just south of oil wells finaled in 4,200 and 4,800 ft. levels of Travis Peak production in Village field. It pumped 20 bbl. per day at 4,540-46 ft.

Lawton Oil Corp. A-1 Ritchie Grocery Co., SW NW 11-14s-20w, pumped 120 bbl. of oil per day from Sligo and Travis Peak perforations for the first well in Troy field proper from these pay zones. The Irma-Troy area 4 miles northeast has Travis production.

What is believed to be a new Travis Peak pay sand for Pace City field in Ouachita County was completed at A-1 Pace et al in SE NE 25-15s-18w by McAlester Fuel Co. Pay is from perforations at 3,105-10 ft. in the first Travis Peak sand.

OKLAHOMA

More Pay Zone Tested At Prolific Maysville Well

More good pay zone is being tested at Carter Oil Co. 1 Maysville Townsite, C SE SE 16-4n-2w, in Garvin County's 10-well Maysville pool.

The well flowed 119 bbl. of oil in 2 hours on ⅜-in. choke from a drill-stem test at 6,518-38 ft. in the Bromide sand. Recovery was 3,870 ft. of clean oil. Big flows were reported on two other drill-stem tests at 6,441-93 and 6,493-6,518 ft. The well flowed 116 bbl. in 3 hours and 150 in 2 hours, respectively.

APPALACHIAN AREA

OHIO

A wildcat, Ohio Fuel Gas 1 Lina Deile, Section 18, intended for the Newburg sand on a small high in the west part of Thorn Township, Perry County, found 250,000 cu. ft. natural in the Berea sand, topped at 744 ft. and tubed at 752 ft.

Practically all wells in the Corning grade field are shut down due to proration and to the difficulty of obtaining new connections. Only one well was completed this week, a small extension in Jackson Township, Knox County. National Gas 1 J. B. Fowls, Section 14, logged Clinton at 2,753-80 ft. and made 53 bbl. in a 24-hour test after fracturing.

WEST VIRGINIA

Blue Sulphur district, Greenbrier County, West Virginia, Columbian Carbon Co. 1-1192 C. W. McClung, rank wildcat, elevation 2,168 ft., was dry, chert 6,620 ft., Oriskany sand 6,711-6,767 ft., with a show of gas, total depth 6,940 ft. Glade district, Webster County, Nelson W. Taylor, agent, 1 L. & H. Arthur, resulted in 660,000 cu. ft., gas, Maxon sand 1,427 ft., gas 1,429 ft., total depth 1,497 ft.

PENNSYLVANIA

Four rank wildcat tests, three in Southwest Pennsylvania, and one in West Virginia, resulted in dry holes in the Oriskany sand.

Monroe Township, Bedford County, Southwest Pennsylvania, John Galey 1 Donald Miller, dry, Oriskany sand 4,880 ft., gas shows 4,999 and 5,114 ft., total depth 5,300 ft. Connellsville Township, Fayette County, Peo-

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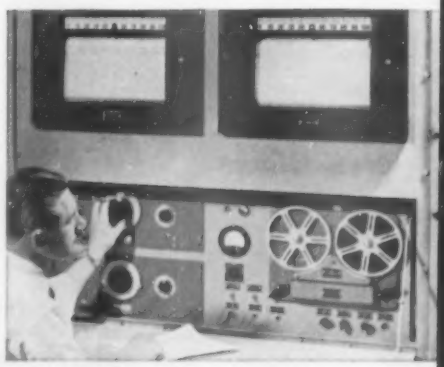
Such exacting research pays off for you in: longer axle life; less maintenance, repairs and downtime; reduced operating expenses. This is why Timken-Detroit axles are preferred by manufacturers and operators everywhere.



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The result: Complete elimination of small, complicated parts and midget-size gears! Larger hypoid-helical design gives more teeth in contact—reducing load per unit of contact area—for more positive, quiet operation. Bearings are larger. There's longer motor and truck life because wear on driving parts is less. When you divide the total gear reduction, you double its life expectancy. And the set of helical gears not in use, always idles at greatly reduced speed. Special gear lubricant is not required. Heavier oil can be used—for a better oil film between gear teeth.

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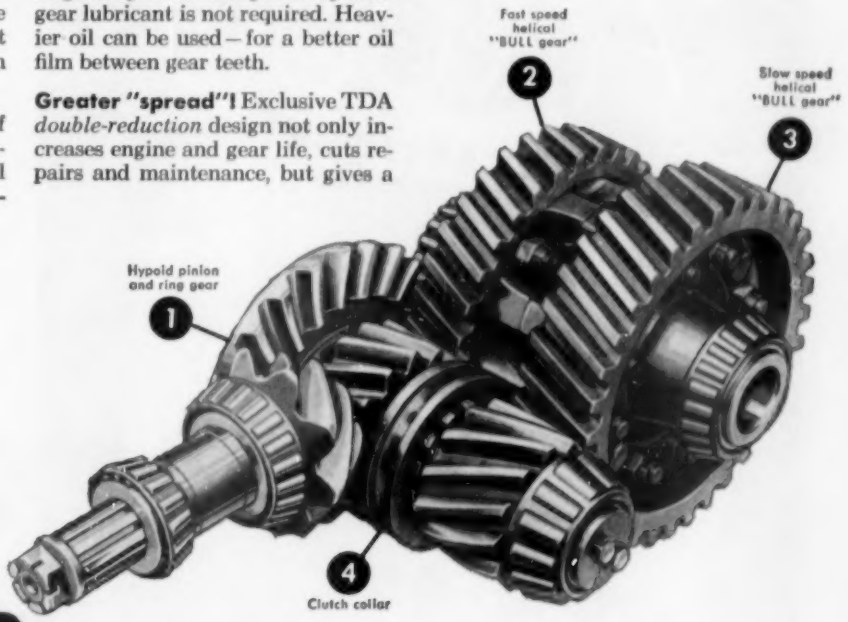

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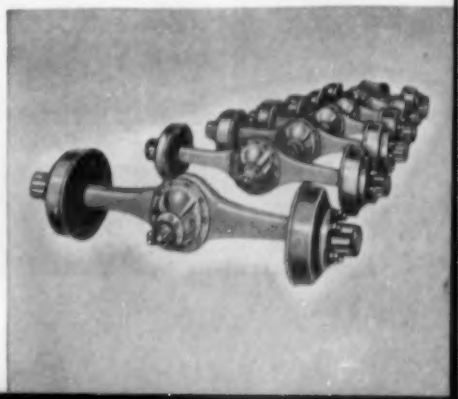

ples Natural Gas Co. 1-4030 F. K. Buttermore heirs, deep test, dry, Onondaga, 8,880 ft., chert 8,900 ft., Oriskany sand 9,069-9,195 ft., total depth 9,261 ft. Cherry Hill Township, Indiana County, Chestnut Ridge Oil & Gas Co. 3 Ralph White, dry, Onondaga 7,765 ft., Oriskany sand 7,923-7,944 ft., total depth 8,005 ft.

KENTUCKY

EASTERN KENTUCKY

In Clay County United Fuel Gas Co.'s wildcat, 5 Fordson Coal Co., had Mississippian Big lime at 1,488 ft. with a slight show of gas from 1,795-1,801 ft. Operators are drilling below 1,850 ft.

On Hatfield Fork of Blackberry Creek in the Pike County sector of the Big Sandy gas field, Colombian Fuel Corp. has completed 1 Willie Farley for an open flow potential of 355,000 cu. ft. of gas daily from Big lime topped at 2,282 ft. with gas from 2,475 to 2,478 ft. Total depth 2,498 ft. Well was Sandfraced for completion.

The Kentucky Geological Survey announces the release of the following publication, issued in cooperation with the Kentucky Oil and Gas Association:

"Proceedings of the Technical Session, Kentucky Oil and Gas Association, annual midyear meeting, May 21, 1954," a symposium consisting of eight separate papers, Kentucky Geological Survey, Series IX, Special Publication No. 6, 6 by 9 in., 97 pp., 34 figures, 10 tables.

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CANADA

EASTERN CANADA

Ontario . . . In Dawn Township, Lambton County, Union Gas Co. of Canada, Ltd., drilling on the Norman F. Wilson farm has encountered about 1,400 ft., gas production estimated at 81,000,000 cu. ft. initial open flow. The flow is shut in pending laying of a line to the Dawn storage field.

In Wellington County, on the R. House farm northeast of Arthur, John L. Ashton of Chatham, drilling for Louis Rose of Detroit is below 400 ft. on a test for oil. The major potential producing horizon is the Trenton limestone, expected 2,000 ft. or less. Drilling was carried on 40 years ago near Shelburne, in the same general area, by James Pickering, without commercial results; and last year Frank Little, drilling for water on his farm 10 miles east of Shelburne, struck a strong gas flow around 500 ft.

Oil Springs . . . In the old Oil Springs field, in Lambton County, Nye de Mers and associates has completed four injection wells and a production well for their secondary oil recovery program. The wells are drilled to approximately 450 ft. and the injection wells are being shot with nitro. In the first well, a second shot at 335-65 ft. accidentally blew out 55 ft. of dry surface casing, but little damage resulted. A third shot was placed at 310-35 ft. When shooting is finished, gas will be forced into the injection wells, followed by water, to push oil from the formation into the production well.

Lake Erie . . . In Lake Erie, south of the old Tilbury gas field, Consolidated West Petroleum is finishing the last of a series of four gassers undertaken this season. The three previous completions, drilled in from 35 to 50 ft. of water and up to 2 miles off shore, had open flows ranging from one to 2½ million cu. ft. The producing horizon is about 1,230 ft. Drilling is carried on from a steel platform set up on a tower securely attached to steel piles driven into the bed of the lake.

ILLINOIS

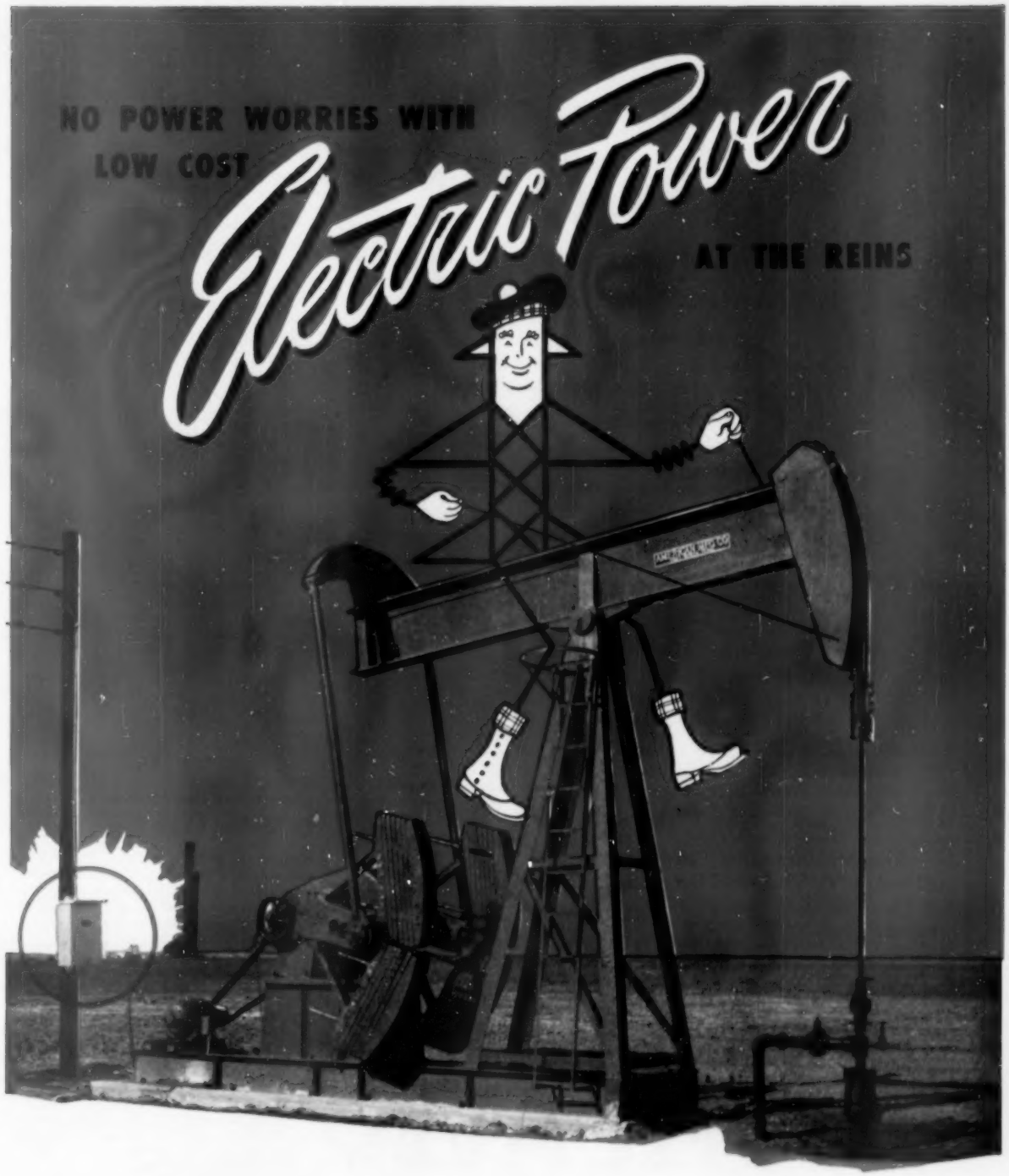
Drilling Rate of Illinois Oil Wells High in September

The number of wells drilled for oil and gas in Illinois during the first 9 months of 1954 exceeds the number drilled during the entire year of 1953.

The total number of completions for 1954 is expected to be the highest for any year since 1941, the peak year for Illinois oil well drilling.

During a 4-week period in September, 290 wells were completed, or about 10 per day. In addition, 15 wells which had previously been completed as dry holes were recompleted as producing wells.

Two new oil pools were discovered in September. One discovery well, that of Iola Central pool in Clay County, had previously been completed as a dry hole. The other new pool, Harristown, near Decatur in Macon County, was the only successful well among the 19 wildcat wells drilled more than 2 miles from production. The 31 wildcat wells drilled less than 2 miles from production discovered extensions to 7 pools: Mount Auburn Consolidated in Christian County, Roby in Sangamon County, Ina in Jefferson County, Burnt Prairie South in White County, Main Consolidated in Crawford County,



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Livingston South in Madison County, and Iuka in Marion County. In pools, there were 171 oil wells and 1 gas well completed.

Six new oil pays were announced for the month. Cypress sandstone production was reported for the first time in Main Consolidated pool in Crawford County, Cantrell Consolidated in Hamilton County, and Eldorado Consolidated in Saline County. Other new pays included the Rosiclare limestone in the Thackery pool in Hamilton County, the Renault sandstone in Ina pool in Jefferson County, and the Paint Creek sandstone in the Norris City pool in White County.

Daily average production during September was about 182,000 bbl., with an estimated production 5,464,000 bbl. of oil for the month. This oil had a value at the wells of over $16,000,000.

Many of the wells completed during the month were better than average. Over one-third of the producing wells had initial productions of over 100 bbl. in 24 hours, and 10 were over 400 bbl. The best well completed in September, in New Harmony Consolidated pool, flowed 875 bbl. in 24 hours from the Aux Vases sandstone.

In White County, 4 miles northeast of New Haven, Eastern Petroleum 1 Pearce heirs, SW NW NW 35-6n-10e, will complete dually in the Aux Vases at 2,824-36 and Rosiclare at 2,910-18 ft. This is a 1-mile stepout operation.

In Jasper County about 7 miles northeast of Newton Vaughn Brown 1 Kitchen, SEc 1-7n-10e, a 3-mile stepout from production, made 120 ft. of clean oil, 60 ft. of mud-cut oil and 90 ft. salt water on McClosky lime drill-stem test at 2,345-63 ft.

TEXAS

WEST TEXAS

Extension Test Flows Wolfcamp Oil

Humble Oil & Refining Co. 1 Henry Halff estate, southeast extension attempt to Amaker-Tippett (Ellenburger) field in central Upton County, was assured of pay in the Wolfcamp on the basis of a drill-stem test.

Testing at 8,970-95 ft., the well gaged 30 bbl. of 43.5° oil in 1 hour on ½-in. choke, and 50.67 bbl. in 1 hour and 25 minutes through 1-in. choke. Gas-oil ratio was 1,014 cu. ft. Flowing pressure ranged from 960-1,830 psi., and 65-minute shut-in pressure reached 2,330 psi. Sample top on the Wolfcamp was 8,230 ft. Drilling continued on an Ellenburger contract.

Dora Roberts completion . . . Cities Service Oil Co. and Forest Oil Corp. 1 Dora Roberts B-1, 3½ miles north of nearest Ellenburger production on Dora Roberts ranch land in southwestern Midland County, has been completed. Calculated daily potential was approximately 1,417 bbl. of oil, based on a 6-hour gage of 354.2 bbl. through 1-in. choke. Pay section was open hole between 12,890-13,012 ft. Gas-oil ratio was 1,195 cu. ft.

Terry County prospect . . . Midwest Oil Corp. and White Eagle Oil Co. 1 Guetersloh, north of Permian production in Adair field, has made a heavy flow of oil from the Pennsylvanian reef. Top of the reef was 8,844 ft. on elevation of 3,242 ft. From perforations at 8,846-64 ft., the well flowed 17 bbl. of oil an hour natural, then flowed 154.47 bbl. of oil in 4 hours after mud-acid treatment.

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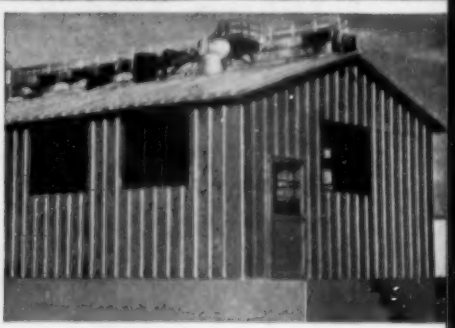

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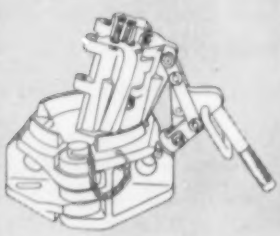

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SOUTHWEST TEXAS

San Patricio County Gets Two New Gas Discoveries

Discovery of a new gas-productive area in San Patricio County has been made by O. K. Smith Drilling Co. The discovery well, 1 Dinn, located 6 miles northwest of Edroy, flowed gas from two zones, one perforated at 4,416-24 ft., and the other at 5,680-88 ft. Testing through ¼-in. chokes, pressure on the upper zone was 1,660 psi., and on the lower zone 1,700 psi. Location is in Section 27, George H. Paul Subdivision, J. J. Welder Ranch.

Wymore Oil Co. also has a shallow gas discovery at its 1 Hogue, a wildcat 3 miles southwest of Taft, in the same county. The well flowed under 650-psi. pressure through ¼-in. choke from perforated interval at 2,454-61 ft. Hole is plugged back from original total depth of 7,300 ft.

Second West Alice Well Uncovers New Pay Zone

Southwest Workover, Inc., operating for Tsesmelis & Dunn, has completed its second producer in the new West Alice field, 3 miles west of Alice, in Jim Wells County.

The new well, 2 Perkins, not only confirms the discovery of production in the area but also opens a deeper sand than that in the discovery well. It flowed 146.75 bbl. of 45.5°-gravity oil per day through ⅛-in. choke with 480-psi. pressure from perforated interval at 5,144-52 ft.

Location is 933 ft. southwest of the discovery well, completed on the pump for 135 bbl. of oil per day from sand at 4,597-4,612 ft.

NORTH TEXAS

Caddo Discovery Finished In Nolan County

A new Caddo limestone field, or northeast extension to the same pay at White Flat, has been opened in northeastern Nolan County at Roark-Hooker & Roark 1 Causseaux, 3 miles northwest of Trent. The well drilled into pay at 5,503 ft. on derrick floor elevation of 1,955 ft. Total depth was 5,700 ft.

Completion potential of 258 bbl. of 48° oil a day through 16/64-in. choke was taken through perforations at 5,506-31 ft. Flowing tubing pressure was 340 psi. and gas-oil ratio was 866 cu. ft.

In Jack County, 3 miles north of Bryson, new pay has been found in the lower Bend conglomerate. The new producer is an old well worked over and recompleted. Henry L. Seale 1 G. L. Jones, located on the north 100-acre lease in E. O. Albritton Survey, A-1813, pumped 255½ bbl. of 45° oil a day from perforations at 4,844-86 ft. The well was originally drilled dry to 5,576 ft.

Clay County prospect . . . George S. Hammons 1-A Edwards, 5 miles northwest of Henrietta, and about 2 miles southeast of production, reported oil and gas shows in a conglomerate section.

A drill-stem test at 6,016-26 ft., open 2 hours, developed 2,700 ft. of gas in the pipe and recovered 45 ft. of oil-cut mud. Operators were drilling ahead on a 6,800-ft. contract.

TEXAS GULF COAST

Deeper Oil Pay Opened In Bonney Area Stepout

San Jacinto Petroleum Corp. is opening a deeper oil-productive sand in the spreading Bonney area, Brazoria County. Its 1 Corbett, north of production and 1 mile south of Bonney townsite, flowed at the rate of 102 bbl. of 37°-gravity oil per day through 10/64-in. choke with pressure of 600 psi. and gas-oil ratio of 1,130 cu. ft. per barrel. New pay is at 7,609-11 ft. The well previously had tested the area's 7,200-ft. horizon, flowing 80 bbl. of high-gravity oil per day through ⅛-in. choke. Nearest well produces from a 7,300-ft. sand. Rig is being moved to another outpost location about 1,600 ft. to the northeast.

Gas-Condensate Discovery Completed In Algoa Area

Superior Oil Co. has completed its new gas-condensate discovery well northeast of Algoa, in Galveston County, with a calculated open-flow potential of 9,400,000 cu. ft. of gas per day. Gas-condensate ratio on open-flow gage was 14,900 cu. ft. per barrel. Condensate gravity was 41.8°. Shut-in pressure built up to 7,685 psi. Production is from perforated intervals at 11,659-65 ft. and 11,686-94 ft.

Discovery well is 1 Cooper Unit, located in the I&GN Survey 13. Drilling is getting under way at the company's second test, 1-A Cooper Unit, located 2,300 ft. north and slightly west of the initial well.

CALIFORNIA

Ventura Deep Pay Extended

Tide Water Associated Oil Co. completed 167 Lloyd at Ventura Avenue to extend D-8 zone production in that field about 1 mile east. Located in 23-3n-23w, the extensioner was bottomed at 12,900 ft. With 1,211 ft. of perforations landed at 12,895 ft., the well produced at a 1,092-bbl. daily rate through 14/64-in. choke.

San Clemente Outpost Testing

The Texas Co. apparently has added a new pool at San Clemente field where its 1 O'Neill estate opened last March in Eocene or Cretaceous sands at 3,935-4,135 ft. The second test, ¼ mile southwest of the discovery, was drilled to 6,475 ft. but was plugged back to 5,850 ft. The new pay was perforated at 5,420-45 ft. and after being fractured was reportedly yielding about 25 bbl. of 33°-gravity crude daily. The Orange County discovery is the state's farthest south oil production.

New Tests for Cuyama

Three new wildcats were preparing to get under way or had been staked for early drilling in Cuyama Valley, which has seen but little exploratory drilling in the past 2 years. About 1½ miles southeast of the South Cuyama field, G. J. Greer was preparing location for a 7,000-ft. test on a farmout from Bandini Petroleum Corp. The wildcat will be 51-17 Bandini in NW NE 17-9n-26w.

About 1½ miles northeast of South Cuyama, Richfield Oil Corp. will drill 66-28 F. K. Perkins, a 11,500-ft. test. Location will be in NW SE 28-10n-26w, about 1 mile west of the 11,800-ft. test it drilled on the Perkins lease several years ago. Third test will be Richfield 48-6 Johnson-B, ¼ mile south of South Cuyama production.

McKittrick Find Offset

With a southeast offset already under way, Tide Water Associated Oil Co. was preparing to start a north offset to its recent prolific Phacoides sand discovery west of Belgian Anticline in Kern County. A. J. West, Oper. 8 T.W.A.-Fee was drilling below 2,500 ft. in NW SW 15-30s-22e. Tide Water's second test will be the "83" well in Section 16. Its 84 well was last reported flowing 387 bbl. daily through an 18/64-in. choke after being completed in early October at a depth of 2,977-3,087 ft.

ROCKY MOUNTAIN

COLORADO

Second Pay Zone Tested at Jackson County Discovery

Lion Oil Co. has recovered oil from Dakota at 1 Dwinell, C NE SW 23-10n-79w, Jackson County. The test in this formation followed apparently commercial recoveries in Lakota.

Dakota was tested at 4,568-4,600 ft., and the well flowed at the rate of 7 bbl. per hour after 1 hour and 53 minutes. Flowing pressure was 210-1,700 psi. Tool was open a total of 2 hours, 13 minutes.

The wildcat was reported a discovery with recovery of 4,270 ft. of oil in 2 hours on test of the Lakota zone 4,627-50 ft. Later test in this formation at 4,650-66 ft. flowed oil at the rate of 7½ bbl. per hour. Flowing pressure was 530-1,710 psi. Tool was open 2 hours, 24 minutes. With total depth of 4,670 ft., Lion is running casing.

The well is about 2 miles north of Dakota production in the North McCallum unit, and is the first recent apparent success in the North Park area. Shows were found in a formation tentatively identified as Frontier, but water was recovered on swab tests.

Archuleta County Gas Discovery Completed

Stanolind Oil & Gas Co. has completed a small gas discovery southeast of Ignacio field in Archuleta County. The well, 1 Bixler Gas Unit, W½ NE SW 14-32n-6w, flowed 279,000 cu. ft. of gas per day from perforations 2,518-62 and 2,590-2,640 ft. Top of Fruitland was picked at 2,460 ft., and Pictured Cliffs top at 2,660 ft.

WYOMING

Deep Park County Discovery Shut In

Sun Oil Co. reported a flow of both oil and gas on early tests of 1 Ralston Unit, C NE NW Tract 51-56n-101w, Park County, and the well has been shut in. Test was of Phosphoria, and no gages were reported. Total depth of the well is 13,299 ft. in Madison. It was deepened to this formation after

having produced from Frontier for about a year, with production declining rapidly. Madison had no show and completion will be in Phosphoria.

NORTH DAKOTA

Williams County Wildcat Flows Oil

Western Nodana Corp. and Paul Rutledge reported a flow of 425 bbl. of oil in 25 hours at 1 Westberg, NW NW 31-159n-95w, Williams County. The well produced from the Madison zone 8,132-38 ft. through ¼-in. choke.

The discovery is 1 mile north and west of nearest production at Tioga. The operators are continuing to test.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: B. G. Byars and C. G. Dunwoody 1 Langley, J. Poitevent Sur. 5, A-697. Dry. TD 5,604 ft.

C. C. Dauchy and Miller Royalty 1 Newman, A. M. Sherry Sur. 50½. Dry. TD 2,287 ft.

Plymouth Oil Co. 1 Finch, Galba Fuqua, A-271. Dry. TD 1,603 ft.

LaSalle County: Frio Producing Co. and O. D. Edwards 1 Pena, H&GN Sur. 19, A-897. Dry. TD 2,243 ft.

Medina County: Coates, Palmer & Schimmel 2 Garnand, G. Rissman Sur. 450, A-820. Dry. TD 1,870 ft.

Travis County: Dan Covert 2 Carlson, L. Kimbro Sur. Dry. TD 770 ft.

District 4

Duval County: Bridwell Oil Co. 2-B Canales Brothers, Share VI, San Diego de Arriba Sur., A-212. Dry. TD 4,892 ft.

Nueces County: Devon-Leduc Oils and H. A. Potter 1 Ellsworth, Sec. 10, Laureles Farm Tracts, Ramon de Ynojosa Sur., A-411. Dry. TD 6,516 ft.

Willacy County: Shell Oil Co. 1 Campbell, Sah Juan de Carricitos Grant, A-8. IPP 15 BOPD (net), 30°, perforations 8,006-10 ft. TD 8,504 ft. (New field.)

TEXAS GULF COAST

District 2

DeWitt County: Pontiac Refining Corp. 1 Lackey, B. B. Lockhart Sur., A-25. Dry. TD 8,529 ft.

Goliad County: Curtis Hankamer 1 McGuill, James and Patrick Bray Sur., A-8. Dry. TD 5,310 ft.

Union Producing Co. 78 Ray, W. A. Moore Sur., A-205. Dry. TD 8,030 ft.

Jackson County: Caribbean Oil Corp. and Starr Oil & Gas Co. 1 Mauritz, M&C Sur. 17, A-236 (Mauritz area). Dry. TD 7,015 ft.

Karnes County: F. M. O'Connor 1 Spielhagen, Victor Blanco Grant, A-3 (Porter area). Dry. TD 7,305 ft.

Live Oak County: Texita Oil Co. and E. W. Gill et al 1 McWhorter estate, F. A. Rogers Sur., A-406. Dry. TD 4,000 ft.

Gust Tsesmelis and Pyramid Drilling Co. 1 Freeborn, John M. C. Nixon Sur. Dry. TD 6,030 ft.

Victoria County: Lagorce Oil Co. 1 Musselman et al, IRR Sur. 55, A-418. Dry. TD 4,524 ft.

District 3

Brazoria County: E. Cockrell, Jr., 2-A Moller, T. W. Grayson Sur. (Stratton Ridge area). Dry. TD 9,789 ft.

Humble Oil & Refining Co. 1 Antwine et al, William Harris Sur., A-71. Dry. TD 10,252 ft.

Charles B. Wrightsman 2 George, G. Gennille Sur., A-131. IP 222 BOPD, 12/64-in., 51.5°, Frio 10,366-80 ft. (perforations). TD 11,005 ft. (New pay in West Columbia field.)

Brazos County: Thomas J. Haberle 1 Creed et al, James Hope Sur., A-22. Dry. TD 3,365 ft.

Fort Bend County: Meredith & Co. and A. W. Franke 1 Cooke, Alexander Phillips Sur., A-300. Dry. TD 8,015 ft.

Galveston County: Superior Oil Co. 1 Cooper unit, I&GN Sur. 13, A-601 (Algoa area). IP 391 BCPD and 5,864 M.c.f. daily, 19/64-in., 41.8°, perforations 11,659-65 ft. and 11,686-94 ft. TD 11,976 ft. (New field.)

Hardin County: Chesser-Sutton-Davis Drilling Co., Inc., 1 Talley, W. B. Allen Sur., A-896. Dry. TD 8,701 ft.

Harris County: Christie, Mitchell & Mitchell 1 Krezdorn, J. S. Smith Sur., A-730. IP 500 M.c.f. daily and 5 BCPD, 8/64-in., Cockfield 5,479-89 ft. (Perforations). TD 6,805 ft. (New field.)

Jasper County: C. B. Webster 1 Marceaux et al, O. H. Stephenson Sur., A-722. Dry. TD 7,312 ft.

Liberty County: H. C. Cockburn 1 McClanahan et al, Amos Green Sur., A-41. Dry. TD 9,005 ft.

Wharton County: Colorado Oil & Gas Corp. and Acco Oil & Gas Co. 1 M. S. Pryor, Trustee, W. Robinson Sur., A-55 (New Taiton area). Dry. TD 7,373 ft.

Holmes Drilling Co. and San Juan Exploration Co. 1 Kountze & Stewart, Mor-

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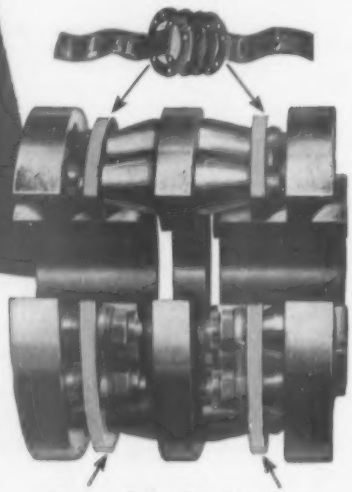

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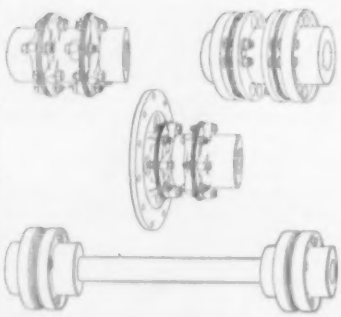
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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Largest Exclusive Coupling Manufacturer in the World

WARREN, PENNSYLVANIA, U.S.A.

AMERICAN IRON

INDUSTRIAL & REFINERY

VALVES & SEATS

Now available in a . . .

Choice of 3 Materials

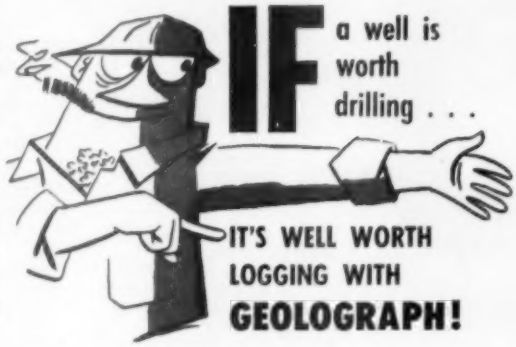
BRONZE Furnished with a laminated phenolic valve plate. Recommended for pressures up to 500 P.S.I. and temperatures up to 275°F.

STAINLESS STEEL All parts of the valve assembly, including the valve plate, are stainless steel. For pressures up to 1200 P.S.I. and for temperatures up to 900°F.

MONEL Used for the most extreme applications and is impervious to most acids and chemicals. Operates at pressures up to 1200 P.S.I. and at temperatures up to 900°F.

The American Industrial and Refinery Valve and Seat is offered in a full range of sizes to fit any make or model of pump, whether tapered or threaded ports.
In addition, these valve and seat assemblies are offered in eight basic sizes in a semi-finished condition, enabling user to fit seats into oversize or worn fluid ports.

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF OILFIELD EQUIPMENT
A
OKLAHOMA CITY U.S.A.



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INDIANAPOLIS IND.
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WILDCAT COMPLETIONS

ris & Cummins Sur. 29, A-290. Dry. TD 7,215 ft.

EAST TEXAS

Anderson County: Stephens, Coats and Moore 1 Dabbs, J. J. Pinson Sur., A-169. Dry. TD 5,555 ft.

Houston County: Reynolds Mining Corp. 1 Knox, Omy Weir Sur., A-93. Dry. TD 9,518 ft.

Kaufman County: L. A. Grelling 1 Booker, E. Hernandez Sur., A-242. Dry. TD 3,715 ft.

Eugene Talbert 1 Boles, E. W. Guthrie Sur., A-185. Dry. TD 2,330 ft.

McLennan County: Falcon Oil Corp. 1 Mattlage, E. C. Woodruff Sur. Dry. TD 7,563 ft.

Marion County: F. R. Jackson 1 Colley, W. Edmondson Sur., A-122, 5 mi. E. Lodi. IP 123.7 BOPD, ¼-in., 41°, TP 500 psi., perforated Mitchell pay 5,986-98 ft. TD 6,040 ft.

Robertson County: Ralph A. Johnston 1 Love, John Trudoe Sur., A-346. Dry. TD 2,598 ft.

Sabine County: Benedum Trees Oil Co. 1 Temple Lumber Co., Wm. W. Davis Sur., A-89. Dry. TD 11,703 ft. Elev. 306 ft., Paluxy 4,860 ft., Austin chalk 7,432 ft., lower Cretaceous 7,528 ft.

Shelby County: Pinkston & Davis 1 Jones, James Smith Sur., A-632. Dry. TD 7,500 ft.

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❶ One of the largest Oil Credit Files in the Nation ❷ a staff of full time appraisers with over 73 Years Combined Oil Business Experience ❸ 11 Nationally known Oil Men on our board ❹ 58 years experience as one of the leading Oil Banks in the Nation . . . Let us prove it pays to —

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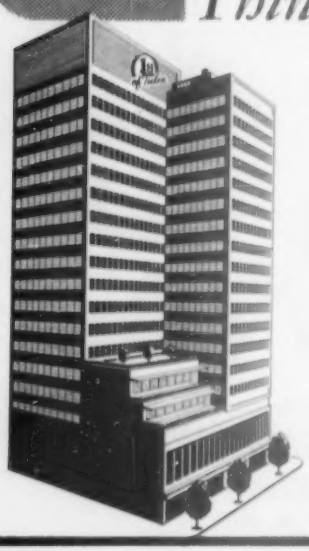

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TEXAS PANHANDLE

Hartley County: Standard Oil Co. of Texas 1 Guilloud, Sr., LE-54, G&M. IPP 38 BOPD, Penn. granite wash 6,164-86 ft., 42°. TD 7,453 ft. (First oil production in Dalhart basin.)

Wheeler County: Stanolind Oil & Gas Co. 1 Hardcastle, L-14, J. M. Linsey, Sur. Dry. TD 3,640 ft.

WEST CENTRAL TEXAS

Callahan County: C. S. Guin 1 Cutbirth, Alfred Smith Sur. 225. Dry. TD 2,080 ft.

Jack Scott 2 Owen, I&GN Sur., Blk. 2. Dry. TD 2,400 ft.

Stroube Central Oil Co. 1 Ross, Sec. 102, BBB&C Sur. Dry. TD 3,502 ft.

Coleman County: Davis & Davis 1 Gray, Blk. 91, C. T. Pendelton Sur. 274. Dry. TD 1,778 ft.

Comanche County: Jess Hickey Oil Corp. 1 Houser, 22-34-Lampasas CSL. Dry. TD 2,900 ft.

Eastland County: Seth Beach 1 McCracken, 72-3-H&TC. Dry. TD 3,900 ft.

O. W. Killiam 1 Bell, Sec. 24, B. G. Riden Sur. Dry. TD 3,800 ft.

W. C. Neill 1 Caraway, 20-1-H&TC. Dry. TD 1,040 ft.

Lynn V. Shirk 1 Craighead, 8-2-H&TC. Dry. TD 1,145 ft.

Jones County: A. J. Frazier 1 King, Sec. 42, OAL Sur. Dry. TD 2,332 ft.

Palo Pinto County: Paul T. Manning 1 Watson, 13-3-T&P. Dry. TD 1,251 ft.

Shackelford County: Marshall R. Young 13-A Cook, Sec. 83, ETRR Sur. Dry. TD 3,282 ft.

Stephens County: Sinclair Oil & Gas Co. 1 Walker, Sec. 1326, TE&L Sur., A-619. Dry. TD 4,497 ft.

Stonewall County: Scott L. Taliaferro 1 Duedensing, Sec. 31, BBB&C. Dry. TD 6,081 ft. TD in Cambrian sand.

Taylor County: Lamar H. Moore et al 1 Tyler, H. S. Day Sur. 4. Dry. TD 3,409 ft.

Throckmorton County: Hale Brothers 1-C Travis CSL, Blk. 52, Travis CSL Sur. Dry. TD 4,010 ft.

R-G Drilling Co. 1 Davis, Sec. 3003, TE&L Sur. Dry. TD 4,906 ft.

NORTH TEXAS

Archer County: Harold Shappell 3-C Hayter, TE&L Sur. 1597. Dry. TD 1,391 ft.

R. E. Veigel 1 Abercrombie, Blk. 152, J. Harris Subd. Dry. TD 1,270 ft.

Baylor County: West Central Drilling Co. 1 Brown, 59-45-H&TC, 3 mi. S. Bomarton. IPP 61.8 BOPD, 35°, Noodle Creek 1,471 ft. TD 1,474 ft.

Cooke County: Delfern Oil Co. 1 Bell, H. Bray Sur., A-105. Dry. TD 4,654 ft.

Foard County: British-American Oil Producing Co. 1 Brookline Trust Co., 27-A-T&NO. Dry. TD 6,435 ft.

Jack County: F. Kirk Johnson 1 Ham, E. L. Myers Sur., A-1482. Dry. TD 3,254 ft.

E. A. Karper 1 Smith, A. Walden Sur., A-93. Dry. TD 4,679 ft.

Russell Maguire 1 Jones, J. M. Henery Sur., A-290. Dry. TD 5,161 ft.

Montague County: Arnold H. Bruner 1 McCall-Fooshee, J. M. Jackson Sur., A-392, 3½ mi. NW Montague. IP 263 BOPD, 28/64-in., 40°, TP 275 psi., GOR 675 cu. ft., Bend conglomerate 6,284-90 ft. TD 6,509 ft.

Wichita County: Murphy Oil Co. 3-B Kempner, Sec. 49, KWVFL Subd. Dry. TD 4,190 ft.

Wilbarger County: Gray Oil Co. 1-K Waggoner, 10-14-H&TC, 3 mi. SW Harrold. IP 153 BOPD, 32/64-in., TP 100 psi.,

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Typical Reliance Protected Motor designed for oil-well pumping service. All other standard enclosures available, with wide choice of mechanical and electrical designs and special mountings. Ratings from ¾ to 300 hp.

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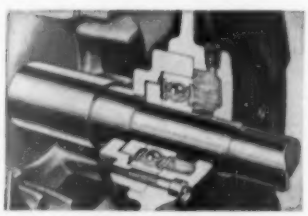

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WILDCAT COMPLETIONS

35°, GOR 400 cu. ft., Canyon 3,176 ft. TD 3,179 ft.

Timberlake & Kelleher 1 Waggoner, 6-17-H&TC. Dry. TD 2,500 ft.

Young County: Cox & Campbell 1 Bruton, TE&L Sur. 703. Dry. TD 870 ft.

M & S Drilling Co. 1 Christian, Lot 30, Young CSL Sur., A-1284. Dry. TD 3,752 ft.

Rankin & Karper 1-A Fields, B. Ford Sur., A-1679. IP 62 BOPD, 12/64-in., TP 300 psi., GOR 750 cu. ft., 41°, conglomerate pay 4,289 ft. TD 4,303 ft.

Turner & West-Riggs 1-A Larrimore, TE&L Sur. 2247, 4 mi. N Newcastle. IP 125 BOPD, 12/64-in., TP 460 psi., GOR 385 cu. ft., 43°, Caddo 4,004 ft. TD 4,070 ft.

Mallard Oil Co. 1 Rubenkoening, J. Poitevent Sur., A-227. Dry. TD 3,700 ft.

Mid-Continent Petroleum Corp. 1 Grubbs, TE&L Sur. 636, A-794. Dry. TD 4,571 ft.

Louis Pitcock 1 Atwood, R. M. Kutch Sur., A-169. Dry. TD 2,570 ft.

L. D. Terry 1 R. A. Smith, Blk. 74, TE&L Sur. Dry. TD 1,145 ft.

T. J. Bass and C. C. Rasmussen 1 Arnold, TE&L Sur. 2445, A-1123. Dry. TD 1,300 ft.

Arnold H. Bruner & Co. 1 Barnett, 177-A424-TE&L. Dry. TD 4,980 ft.

C. G. Butts 1 Logan estate, Blk. 18, I. Holman Sur., 5 mi. SE Megargel. IPP 10½ BOPD, 38°, pay 1,216 ft. TD 1,225 ft.

WEST TEXAS

Crockett County: Stanolind Oil & Gas Co. 1 Vaughn, 6-UV-GC&SF. Dry. TD 7,900 ft.

Menard County: Tucker Drilling Co. 1 Callan, Sec. 27, AB&M Sur. 27, 11 mi. N Ft. McKavett. Dry. TD 5,830 ft.

Reagan County: S. B. Roberts 1 Superior-University, 5-48-University Lands. Dry. TD 2,636 ft.

Terry County: Anderson-Prichard Oil Corp. 1 Oil Development Co., Sec. 152, Blk. D11, J. H. Gibson Sur., 1½ mi. NW Wellman. IP 509 BOPD, ¾-in., TP 70 psi., GOR 16 cu. ft., 34°, Devonian perforations 12,763-12,778 ft. TD 12,797 ft.

R. J. Caraway 1 Johnson, 41-25-H&TC. Dry. TD 5,655 ft.

R. J. Caraway 1-A Johnson, 42-25-H&TC. Dry. TD 5,276 ft. Elev. 2,200 ft., Strawn 5,250 ft.

Tom Green County: R. J. Caraway 1 Mees, Sec. 102, SPRR Sur., District 11. Dry. TD 5,965 ft.

C. L. Norsworthy, Jr. 1 Robertson, 18-22-H&TC. Dry. TD 7,013 ft.

Yoakum County: Texas Pacific Coal & Oil Co., 55 Ruth Bennett "E", 694-D-J. H. Gibson Sur., 7 mi. SE Plains. IP 156 BOPD., 24/64-in., 30°, TP 75 psi., GOR 661 cu. ft., pay 7,800 ft. TD 10,215 ft.

WEST TEXAS BORDER COUNTIES

Coke County: Harper & Huffman 1 Eubanks, 447-1A-H&TC. Dry. TD 6,151 ft.

Fisher County: Allison & Prestridge 1 Ohlenbusch, 12-Y-T&P. Dry. TD 7,106 ft.

Humble Oil & Refining Co. 1 Touchstone-Maberry, 1-19-T&P, 6 mi. NE Trent. IP 333 BOPD, ¼-in., 42°, TP 475 psi., GOR 1,026 cu. ft., Strawn perforations 4,797-4,817 ft. TD 5,732 ft.

Runnels County: Gulf Oil Corp. 1 Sanford, L. Forsythe Sur. 450, A-176, 2 mi. NE Wingate. IP 425 BOPD, ½-in., 40°, TP 340-205 psi., pay 4,511 ft. TD 4,570 ft.

And Now...

RCA Announces the FIRST Low-Cost

Packaged Microwave

with Voice Channels

PROVED throughout the nation and the world, RCA 960 megacycle Microwave is now available in a low-cost "package" unit, MM-9, as a complete station.

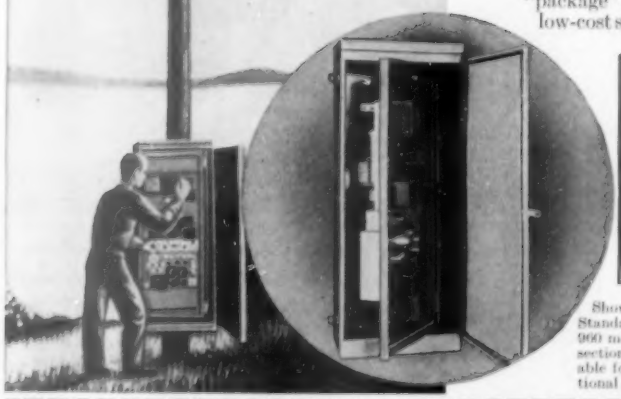
Important savings include:

- **Minimum real estate requirements**
- **No tower construction**
- **Easy economical installation**
- **Minimum maintenance**
- **Unattended reliable operation**

When mounted on inexpensive supports, such as wooden poles, up to 100 feet high, or on existing structures, which can be spaced 20 or more miles apart, the MM-9 Microwave "package" units provide an ideal low-cost solution to many point-to-point communications problems.

RCA Microwave uses highly directional radio signals which are beamed from one relay station to the next by "dish" antennas. It can be interconnected with existing telephone lines and switchboards and virtually eliminates the weather hazards of carrier and wire lines. RCA Microwave employs readily available tubes and familiar circuits which are easy to service. The RCA Service Company provides nationwide installation and service facilities, if desired.

For complete information on the new MM-9 Packaged Microwave Stations, send coupon, below.



Showing hinged rack construction, with all components easily accessible for servicing. Standard "package" equipment includes weather-proof cabinet, 2 parabolic reflectors, 960 megacycle transmitter unit, exciter unit, 960 megacycle receiver. Also 2 100-ft. sections of semi-flexible transmission lines with all required fittings. Space is available for multiplex equipment to provide two voice channels with signaling. Additional multiplex equipment can be mounted in a similar cabinet.

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1. Telephone Circuits
2. Supervisory Control
3. Remote VHF Control
4. Facsimile
5. Teletype

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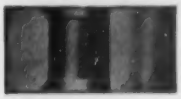
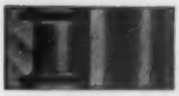
Ball and Seat ASSEMBLIES



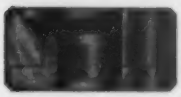
"Single Seal" Seat

A competitively priced stainless steel seat for routine pumping.



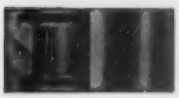
"Double Seal" Seat

For harder than usual pumping—double contact with the ball.



"O-Ring" Seat

Recommended particularly where ordinary or fracturing sand is causing seat failures. A 2-piece seat made of stainless steel.



"Sheralloy" Seat

A cast alloy definitely proven resistant to corrosion. Also good for hard pumping.

"Stainless Steel" Ball

For ordinary pumping where little trouble is encountered.

"Ceramic" Ball

Nearly as hard as a diamond. Non-corrosive and non-magnetic.

"Monel or Hastelloy D" Ball

Both are non-magnetic and quite resistant to corrosion but are softer than stainless steel balls. Monel is cheaper.

"Sheralloy" Ball

Excellent to combat corrosion and hard enough for deep pumping. Non-magnetic.

What is your trouble?

CORROSION?

Deep Pumping — Use a Baird "Sheralloy" seat with a "Ceramic" ball.

Shallow Pumping — Use a Baird "Stellite" seat with a "Monel or Hastelloy D" ball.

BALL PITTING?

Use a Baird "Double Seal Stainless" seat with a "Ceramic" ball.

FRACTURING or FLOATING SAND?

Use a Baird "O-Ring" seat with a Stainless ball.

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WILDCAT COMPLETIONS

SOUTHEAST NEW MEXICO

Eddy County: Stanolind Oil & Gas Co. 1 Welch Unit, 12-26s-27e. Dry. TD 12,547 ft. Elev. 3,245 ft., Delaware sand 2,080 ft., Bone Springs 5,665 ft., Wolfcamp 8,945 ft., Pennsylvanian 11,200 ft.

INDIANA

Daviess County: Lohman & Johnson 1 Pershing, SW SW SW 28-5n-5w. Dry. TD 995 ft.

Paul F. Ritter 1 Ramsey-Simmons, NW NW SE 27-4n-7w. Dry. TD 1,490 ft.

Dubois County: Wheeler Drilling Co. 1 Bonifer, SW SW NW 27-1s-6w. Dry. TD 1,409 ft.

Spencer County: Grant Mattinax 1 Kron, SE SE SE 11-5s-6w. IPP 12 BOPD, Cypress 1,012-16 ft. TD 1,016 ft. Extends South Gentryville pool.

Sullivan County: O. Thayer 1 Stanley, SE NW SE 26-8n-10w. IP 370 M.c.f. of gas per day, Penn. sand. TD 796 ft. Extends old Sullivan gas field.

WESTERN KENTUCKY

Davies County: Stevens Drilling Co. 1 Oliver, NE NW NE 11-Q-31. Dry. TD 1,285 ft.

R. H. Compton 1(2) Nicely, SW NE SE 13-O-30. Dry. TD 1,037 ft.

Hancock County: Hoosier Drilling Co. 1 Eminick, SW NE NE 17-R-32. Dry. TD 1,170 ft.

Muhlenberg County: Adams Petroleum 1(2) McKinney, NE SW NW 15-H-30. Dry. TD 1,380 ft.

MICHIGAN

Isabella County: Leonard Oil, Inc. 1 Woodin, NW SW SW 35-16n-6w. Dry. TD 3,765 ft. in Dundee.

Mecosta County: McClure Oil Co. and I. W. Hartman 1 Stockwell, NE NE SE 22-16n-8w. Dry. TD 3,867 ft. in Dundee.

Van Buren County: Harris Oil Co. 1 Heinze, S½ SE NE 30-1s-16w. Dry. TD 1,030 ft. in Traverse lime.

PENNSYLVANIA

Bedford County, Monroe Township: John Galey 1 Donald H. Miller. Dry. Oriskany sand 4,880 ft., show gas 4,999 and 5,114 ft., TD 5,300 ft.

Fayette County, Connellsville Township: Peoples Natural Gas Co. 1-4030 F. K. Buttermore heirs. Dry. Onondaga 8,880 ft., chert 8,900 ft. Oriskany sand 9,069-9,195 ft., TD 9,261 ft.

Indiana County, Cherry Hill Township: Chestnut Ridge Oil & Gas Co. 3 Ralph White. Dry. Onondaga 7,765 ft., Oriskany sand 7,923-7,944 ft., TD 8,005 ft.

WEST VIRGINIA

Greenbrier County, Blue Sulphur district: Columbian Carbon Co. 1-1192 C. W. McClung, elevation 2,168 ft. Dry. Chert 6,620 ft., Oriskany sand 6,711-6,767 ft., show of gas. TD 6,940 ft.

Webster County, Glade district: Nelson W. Taylor, Agent 1 L. & H. Arthur 660,000 cu. ft. gas, Maxon sand, 1,427 ft., gas 1,429 ft., TD 1,497 ft.

ALABAMA

Baldwin County: Placid Oil Co. 1 Bacon-McMillan, 32-2n-1e. Dry. TD 9,009 ft.

Escambia County: Walter F. Hamilton 1 Stone et al, NE NW SE 3-1n-5e. Dry. TD 6,813 ft. Elev. 301 ft., Lower Cretaceous 6,726 ft.

MISSISSIPPI

George County: I. P. La Rue, G. G. Stanford, and Crow Drilling Co. 1 Boss et al, C NE NE 12-2s-5w. Dry. TD 8,503 ft. Elev. 103 ft., Lower Cretaceous 8,273 ft.

Jefferson County: Jett Drilling Co.-Michael-Greer 1 Board of Supervisors, SW SE 35-10n-1w. Dry. TD 6,011 ft. Elev. 158 ft., Wilcox 3,598 ft., Artman 5,269 ft.

Kemper County: Roy A. Lamb and A. G. Galt 1 Phillips estate, SW SE 2-9n-17e. Dry. TD 4,576 ft. Elev. 301 ft., Lower Cretaceous 3,183 ft., Paleozoic 4,325 ft.

SOUTH LOUISIANA

Acadia Parish: Hassie Hunt Trust 1 Lambert, 43-8s-1w. Dry. TD 11,504 ft.

Calcasieu Parish: Trans-Tex Drilling Co. 1 Farmers Land & Canal Co., 13-10s-7w. Dry. TD 10,515 ft.

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Some of the biggest changes in the constantly changing automotive field are the hardest to see—the changes in gasoline. Actually, there have been great improvements in gasoline over the years. Except for the introduction of tetraethyl lead in 1922, most of the changes have come through improved refining methods.

Shell Oil Company has been in the forefront of research to provide more efficient gasoline. One result of this effort is TCP, which has opened a new era in fuel improvement through the use of chemical additives. TCP is another example of how Shell research contributes to progress by being first with better petroleum products.

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WILDCAT COMPLETIONS

Evangeline Parish: Continental Oil Co. 4 Tate, 44-3s-3e. Dry. TD 13,379 ft. (Exploratory test in Villa Platte field.)

Iberville Parish: Shell Oil Co. Schwing, 99-10s-10e. IP 130 BCPD, 15/64-in., 52.6°, perforations 10,976-980 ft. TD 11,300 ft. (New field.)

NORTH LOUISIANA

Caddo Parish: Ross Production Co. 1 Williams, 24-22n-16w. Dry. TD 2,985 ft.

Tensas Parish: Union Producing Co. 15 Penrod-Jurden, 17-11n-10e. IPF 65 BOPD, Wilcox 3,031-32 ft., 7/64-in., 28.5°. TD 5,740 ft. Extension to Holly Ridge field.

ARKANSAS

Conway County: Carter Oil Co. 1 Jones, C NE SW 8-6n-15w. Dry. TD 5,138 ft.

OKLAHOMA

Caddo County: Magnolia et al 1 Ke-ah-bone, SW NW SW 28-7n-13w. Dry. TD 11,636 ft.

Garfield County: Weimer & Fitzhugh 1 Baker, NW NE NW 13-22n-3w. IPF 200 BOPD, second Wilcox 5,476-80 ft., 39°, ¼-in. TD 5,550 ft. (Oil discovery.)

Grady County: F. J. McCurdy, Jr. et al 1 Bowen, C SW SW 18-5n-6w. IPF 300 BOPD, Deese 9,980-10,018 ft., 38.5°, 24/64-in. TD 10,510 ft. (Oil discovery.)

Magnolia Petroleum Co. 1 Jones, C SE NE 22-4n-5w. IPP 68 BOPD, Hart 9,380-9,426 ft., 32.5°. TD 12,514 ft. (Oil discovery.)

Gulf Oil Corp. 1 Costello, C NE SE 14-5n-5w. IPF 1,872 BOPD, 4,200 M.c.f. of gas per day, Bromide sand 11,747-11,890 ft., 49°, 32/64-in. TD 12,771 ft. (Oil discovery.)

Grant County: Cities Service Oil Co. 1 Wald, SW SW NE 22-25n-5w. Dry. TD 6,128 ft.

Havenstrite Oil Co. 1 Priboth, C NE NW 11-27n-3w. Dry. TD 4,420 ft.

Greer County: Geo. Urich 1 Murray, SE SE SE 20-7n-21w. Dry. TD 1,274 ft.

Hughes County: Jack Robinson 1 Joyce, NW NW NW 25-5n-9e. Dry. TD 430 ft.

McAlester Fuel Co. 1 Whitney, C SW NW 14-8n-11e. IP 2,200 M.c.f. of gas per day, Booch 2,402-35 ft., ½-in. TD 3,321 ft. (Gas discovery.)

Kay County: Hill & Hill Oil Production Co. 1 Schramm, NE SW SW 29-28n-3e. Dry. TD 3,369 ft.

Lincoln County: Blackwood & Nichols 1 Tomlinson, SW SW NE 21-16n-2e. Dry. TD 5,294 ft.

Shirley Thompson and Ray Huffman 1 S. Thompson, SW NW SE 23-16n-4e. Dry. TD 4,225 ft.

McClain County: Carter Oil Co. 1 Neal, NW SE NW 23-6n-3w. IPF 225 BOPD, Bromide 9,238-58 ft., 41°, ¼-in. TD 10,373 ft. (Oil discovery.)

Pontotoc County: T. W. Fentem, Jr. 1 Stegall, NE SE NE NW 8-2n-7e. Dry. TD 585 ft.

J. M. Boyd 2 Boyne, NE SW SW 16-5n-6e. IPF 42 BOPD, Hunton and Viola 2,505-2,960 ft., 25°, tubing choke. TD 3,850 ft. (New pay at Wetley pool.)

KANSAS

Barber County: Harms & Burt Drilling Co. 1 Smith, NW NW NW 11-32s-12w. IPF 93 BOPD, Miss. 4,230-40 ft. TD 4,240 ft. (Opens Southwest Whelan pool.)

Purcell & Mull 1 Lake, NW SW NW 12-32s-14w. IP 7,900 M.c.f. of gas per day, Lansing 3,808-24 ft. TD 4,865 ft. (opens Little Bear Creek pool.)

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YEARS AGO, ALAS, many publishers weren't as honest as most are now. They padded their circulation figures in hopes of attracting advertising. They continued to serve subscribers who didn't renew, enticed new readers with premiums worth more than the subscription price, and gave copies away free if they couldn't sell them.

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WILDCAT COMPLETIONS

Barbara Oil Co.-R. C. Patton Drilling Co. 1 McClure, SW SW SW 6-33s-11w. IP 3,304 M.c.f. of gas per day, Douglas 3,548-71 ft. TD 4,891 ft. (Gas discovery.)

Butler County: Chas. Gould 2 Tory, SE NW NW 14-29s-3e. Dry. TD 2,282 ft.

Dickinson County: Finchert West 1 Jones, SW SW SE 10-16s-1e. Dry. TD 2,628 ft.

Edwards County: Twin Oil Co. 1 Britton, SW SW NW 9-25s-17w. Dry. TD 4,876 ft.

Aurora Gasoline Corp.-Anschutz Drilling Co. et al 1 Fisher, NE NE NE 35-26s-17w. Dry. TD 4,962 ft.

Ellis County: Franco-Central 1 Lang, SW SW NW 12-14s-17w. Dry. TD 3,607 ft.

Graham County: Bennett & Roberts 1 Kenyon, SW SW SW 17-8s-21w. Dry. TD 3,740 ft.

Imperial Drilling Co. 1 Gano, NW NW SW 1-10s-24w. Dry. TD 4,524 ft.

Kingman County: Berwick-Aurora Gasoline 1 Murphy, SW SW NW 30-28s-9w. Dry. TD 4,688 ft.

Marion County: R. Jones 1 Grosse, SE SW SW 14-20s-3e. Dry. TD 2,696 ft.

Meade County: The Ohio Oil Co. 1 Bond, NW NW SE 32-33s-30w. IPP 129 BOPD, Atoka 5,619-31 ft. TD 5,890 ft. (Opens Bond pool.)

Osborne County: Markham 1 Enochs, C S½ SE NE 25-8s-13w. Dry. TD 4,162 ft.

Reno County: Rupp-Ferguson 1 Hickman, SW SW SW 5-26s-10w. Dry. TD 4,379 ft.

Stafford County: Shelley-Miller 1 Witt, NE NE NE 25-22s-13w. Dry. TD 3,790 ft.

Lavenstien Bros. 1 Allen, SE SW SW 3-23s-12w. Dry. TD 3,790 ft.

Trego County: Stanolind Oil & Gas Co. 1 Scott, NW SW SW 16-11s-22w. IPP 39 BOPD, Marmaton 3,844-54 ft. TD 3,970 ft. (Opens East Hixon pool.)

Schafer Drilling Co. 1 Nicholson, NW NW NW 15-14s-21w. Dry. TD 4,020 ft.

NEBRASKA

Banner County: Tuley & Carter 1 Barrett, NE NE SE 23-18n-56w. Dry. TD 6,380 ft.

Cheyenne County, Itner: Ryan Oil Co.-Davis Oil Co. 1 Itner, NW NW NW 9-15n-52w. IPP 386 BOPD, "J" sand discovery, new field. TD 5,441 ft. "J" sand.

Grant County: Lubar Oil Co.-Strain Drilling Co. 1 Sutton, SW SW SE 3-21n-41w. Dry. TD 5,150 ft. Granite wash.

Kimball County, Leonard: Don Rounds et al 1 Leonard, NW NW NW 7-12n-55w. IPP 125 BOPD, "J" sand discovery, new field. TD 6,510 ft.

Scottsbluff County: Garfield-Pasternak-Sapphire American 1 Bresee, C NW NE 7-20n-54w. Dry. TD 5,118 ft. "J" sand.

NORTH DAKOTA

Burleigh County: Caroline Hunt 1 Board of University and School Lands, NE NE 36-144n-75w. Dry. TD 6,300 ft. Winnipeg.

Sheridan County: Caroline Hunt 1 Matz, NE NE 1-147n-75w. Dry. TD 6,400 ft. Winnipeg.

Stutsman County: Calvert Exploration 1 Wanzek, NW NW 12-139n-67w. Dry. TD 3,899 ft. Granite.

CALIFORNIA

Contra Costa County: Lightning Gas & Oil Co. 6 Almond, 31-2n-2w. Dry. TD 4,024 ft.

Kern County: Morton & Dolley & MJM & M Oil Co. 1 Cunningham, 18-30s-29e. Dry. TD 3,885 ft.

G. R. Nance & Associates 1 Intex-Movius-USL, 8-28s-28e. Dry. TD 3,666 ft.

Orange County, Monterey Oil Co. 3 Monterey-Texas-State, offshore in 22-5s-12w, IPF 300 bbl. of 26.4° gravity through 30/64-in. choke, perfs. 5,906-6,280 ft., TD 10,162 ft., P.B. 6,280 ft. (New discovery 1½ miles offshore from Seal Beach.)

San Joaquin County: Superior Oil Co. 73-25 Marti et al, 25-2s-5e. Dry. TD 4,746 ft.

San Luis Obispo County: C. W. Colgrove 33-5 Russell, 5-10n-26w. Dry. TD 5,238 ft.

Intex Oil Co. 1 Sauret, 25-26s-11e. Dry. TD 1,983 ft.

Tulare County: A. O. Margoles 1 Hovsepian, 33-16s-24e. Dry. TD 1,015 ft.

Ventura County: Superior Oil Co. 1 Ferro, 11-2n-22w. Dry. TD 6,830 ft.

MONTANA

Garfield County, Cat Creek: The California Co. 1 Peterson, C NW NE 13-15n-30e. Dry. TD 8,096 ft. Cambrian.

Toole County: Merritt D. Orr-Simmes-Sanus 1 Government, SW NE SE 2-36n-4w. Dry. TD 2,720 ft. Madison.

WYOMING

Fremont County, Green Mountain: The California Co. 3 Unit-Government, NE SE NW 2-23n-94w. Dry. TD 3,095 ft. Cambrian.

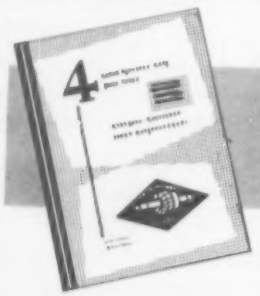
Goshen County, Wheatland Structure: Eddie Fisher 1 Government, C SE NE 23-26n-65w. Junked hole. TD 3,125 ft.

Hot Springs County, Zimmerman Butte: Hancock Oil Co. 1 Government, C SW

(Continued on page 210)

THE OIL AND GAS JOURNAL

"Hey, Snodgrass, shake hands with Mr. Easly — He does things with pipe."



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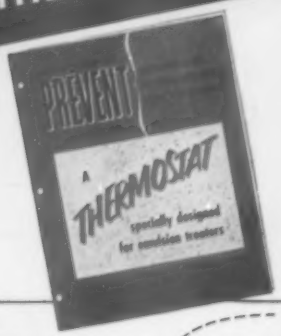

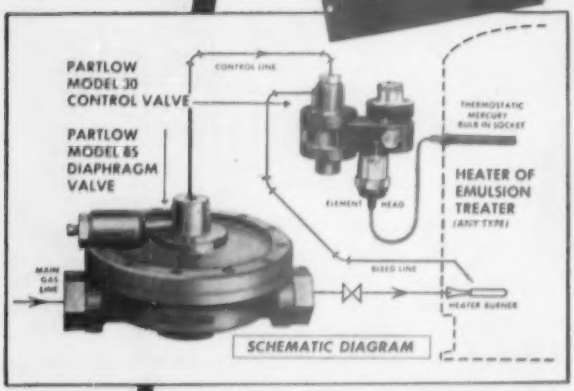

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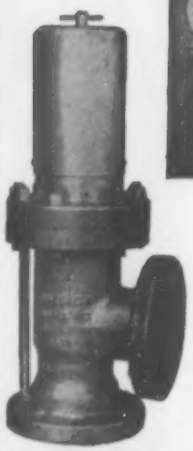

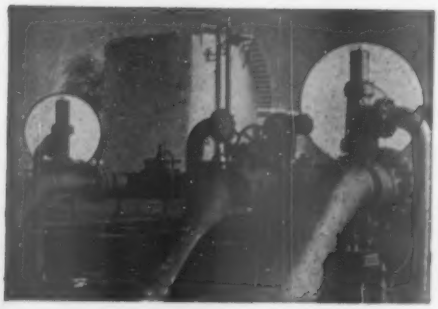

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McBride Expanding

First venture in refining was to supply own outlets

H. L. McBRIDE, head of a thriving South Texas refining company, got in the refining business through the back door.

After experiencing unusual success in the gasoline and oil-jobbing business, McBride organized a gasoline-transport company and soon established a string of service stations. His retail business spread so rapidly that he began to worry about his source of supply, and in 1940 he founded the McBride Refining Co. at La Blanca, Tex., largely as a means of self-preservation.

The refining venture soon outgrew the announced purpose of supplying his own gasoline outlets, and McBride decided to sell his marketing facilities "out of fairness to other jobbers."

"I didn't want to be in the position of competing against my own customers," he explained.

Producer, too . . . Coupled with his refining operations was an expanding crude-production business. The McBride Producing Co., which he also headed, operated several well-saturated leases in the Sam Fordyce field for many years and provided a large amount of the McBride Refining Co.'s crude needs.

Enthused by his first venture in the refining business, McBride soon waded in up to his neck by establishing Port Fuel Co., Inc., to operate a 7,500-bbl. refinery at Brownsville, Tex.

His closely integrated operations now assumed an international role. His Brownsville refinery, with tanker outlets, produced gasoline and various fuel oils for both domestic and export markets. This year, in the midst of a multimillion-dollar expansion program, McBride started receiving crude shipments at the Brownsville refinery from Mexico under a 5-year contract involving an expenditure of some $22,000,000.

Expansion program . . . The long-range expansion program calls for enlargement of the Brownsville refinery and expansion of his production interests scattered through Texas and Oklahoma.

Capacity of the Brownsville plant has been boosted during the past year from 7,500 bbl. daily to about 10,000 bbl. Plans call for further expansion to boost the capacity to 20,000 bbl. daily.

The program also involved amalgamation of McBride's widespread petroleum interests into one big company, McBride Oil & Gas Corp.

Farming activities . . . Branching out into agriculture in 1941, McBride has been as successful in drilling water wells as oil wells. After striking deep-well artesian water in the arid area of northern Hidalgo County, he developed his 6,000-acre "Ranch Arrowhead" there into a showplace of modern agricultural methods.

McBride also has conducted land-development projects in Blanco County north of San Antonio and in Kerr and Bandera counties. He is a member of the American Braham Breeders Association.

Background . . . Born near Humble, Tex., a few miles north of Houston, McBride grew up in Port Arthur where his father was a druggist.

McBride, now 47, started his business career at an early age. "I was raised next door to a commercial photographer," he says. "I went to work in his dark room and, by gosh, by the time I was 14 I had developed thousands of pictures."

While outside the dark room, young McBride specialized in the then hazardous business of aerial photography. Since flying in an old World War I Jenny seemed more romantic to him than to his employer, the teen-age boy got most of the aerial assignments.

"I don't think he liked the idea of taking aerial shots from those old beat-up airplanes, so he gave me the assignment and I'd go up and do the shooting," McBride explains.

Although McBride long ago abandoned photography as a profession, he still finds time for picture snapping as he hustles back and forth between San Antonio and his far-flung business operations. But his favorite picture subjects now are his wife and four children, whose likenesses have been recorded by nearly every kind of camera imaginable.

M. W. Nicholas has been named refining staff manager by Ohio Oil Co. Before his promotion, Nicholas had

NICHOLAS

MUSGRAVE

been serving as assistant to the manager of refining. He began his career with Ohio in 1928 as a clerk at the Robinson, Ill., refinery. **R. W. S. Musgrave** has been advanced from chief refining engineer to refining engineer manager. Musgrave has been an engineer with Ohio for more than 26 years. He started with the company at Robinson and was named chief refining engineer there in 1946.

James C. Phelps has been promoted to superintendent of Pioneer Pipe Line Co. with offices in Woods Cross, Utah.

J. E. CLARK

J. E. Clark, former manager of Shell Oil Co.'s Denver exploration and production area, has been elected vice president in charge of Midland, Tex., area. Clark succeeds **Joe T. Dickerson,** who was recently named president of Shell Pipe Line Corp.

Bob Nicklas, of Loffland Brothers Co., has been elected chairman of the Denver chapter of the American Association of Drilling Contractors. Other officers named were **Will I. Lewis, Jr.,** Will I. Lewis Drilling Co., vice chairman, and **A. J. Courson,** Love-Miller Drilling Co., secretary-treasurer. **R. L. Manning, Jr.,** retiring chairman, was named Rocky Mountain region vice president to the national organization,

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PERSONALS

and **Harold Carmack,** Carmack Drilling Co., and **O. E. Mechem,** Delta Drilling Co., were elected to the A.A.O.D.C. board of directors from Denver.

D. M. Withers has been appointed manager of the Canadian division with headquarters at Calgary by Stanolind Oil & Gas Co.

C. D. Borland has been promoted to assistant zone superintendent of production at Roswell, N. M., by Gulf Oil Corp. Before his promotion, Borland was zone petroleum engineer with Gulf at Odessa, Tex.

E. A. Galvin has been named division gas engineer at Calgary by Canadian Gulf Oil Co. Previously he had been serving as manager of the Paloma (Calif.) unit of Western Gulf Oil Co.

John H. Harmon, Jr., has been named general purchasing agent of Pure Oil Co. succeeding **G. L. Parsons,** who after 30 years in the position, has been named purchasing agent emeritus. Harmon was hired by Parsons for Pure as an open order clerk in April 1934.

Prof. W. L. Nelson, member of the chemical and petroleum refining engineering department at University of Tulsa and technical editor of The Oil and Gas Journal, will sail October 28 for Buenos Aires, Argentina, and Sao Paulo, Brazil. Nelson has acted as technical director for a 25,000-bbl. refinery which is being constructed at Sao Paulo by Refineria Y Explorocoa du Petroleo (U.N.I.A.O.) S.A. The plant is expected to be in full operation by December or January.

Paul D. Williams has been named acting secretary-treasurer of the Western Petroleum Refiners Association to succeed John C. Day, who died October 5. Williams has been associated with the oil industry since 1931. Before joining the staff of W.P.R.A., Williams was with Globe Oil & Refining Co., the old Omar Refining Co., and Lario Oil & Gas Co. He also served over 4 years as chief chemist for the Oil and Gas Conservation Department of the Oklahoma Corporation Commission. For the past 10 years he has served as technical director of W.P.R.A.

Petroleum Electric Power Association Elects

Petroleum Electric Power Association elected officers for 1954-55 year at its recent meeting in New Orleans. Officers elected are (left to right): Fred B. Clark, Arkansas Power & Light Co., vice president; W. L. Pearson, Southwestern Public Service Co., president; and F. R. Woerner, Texas Electric Service Co., secretary-treasurer. Before closing the final session, the group voted to hold its 1955 meeting in Dallas.

E. Russell Griffith has joined American Gas Association as a research engineer. Griffith, who will work primarily on pipeline research, has been serving in the gas department of Ford, Bacon & Davis, Inc.

G. L. Maciula has been named assistant division manager of the Illinois division by Service Pipe Line Co. Before his appointment, Maciula had been serving as assistant division manager for southern Oklahoma. **W. N. Sivers,** who has been serving as assistant division manager for northern Oklahoma, was named assistant manager for the entire Oklahoma division.

J. L. Stauss, executive vice president of Falcon Seaboard Drilling Co., has been elected chairman of the Tulsa chapter of American Association of Oilwell Drilling Contractors for 1955. Other officers in the Tulsa chapter are: **T. W. Wheeler,** Loffland Brothers Co., vice chairman; **J. R. Yost,** Zephyr Drilling Co., secretary; and **M. D. McBride,** Arrow Drilling Co., treasurer. New officers of the central Oklahoma chapter of A.A.O.D.C. are: **Robert B. McCloy,** Bix X Drilling Co., Inc., chairman; **Gerald N. Eason,** Fain-Porter Drilling Co., vice chairman; and **W. R. Ewert,** Kerr-McGee Oil Industries, Inc., secretary-treasurer.

John (Jack) Henton has been named geologist - manager of the recently opened Mattoon, Ill., offices of The California Co., a subsidiary of Standard Oil Co. of California. **R. Pierson** has been named geological assistant to Henton.

Gordon Simpson has been named president of General American Oil Co. of Texas, succeeding **Malcolm E. Wilson,** who was elected chairman of the board. Before his appointment as president, Simpson had been serving as executive vice president of the company.

Methias Gebel, Jr., has been transferred from Hobbs to Roswell, N. M., by Gulf Oil Corp. and promoted to assistant zone geologist. **G. W. Osborne,** has been named gasoline-plant foreman at the company's Eunice, N. M., plant. **R. L. Burch, Jr.,** has been named field foreman for Gulf at Kermit, Tex. **Eugene Demmler,** area petroleum engineer, has been transferred from Goldsmith to Andrews,

PERSONALS

Tex., and **B. D. McKendree,** petroleum engineer, has been transferred from Judkins to Andrews.

Jack L. McClellan, geologist with Gulf Oil Co. at Midland, Tex., has been transferred to Hobbs, N. M.

F. J. SANDERS

Dr. F. J. Sanders, former technical manager of Standard Oil Co. (Ohio) manufacturing department technical division, has been promoted to engineering manager. **Joseph August,** who has been serving as assistant to the technical manager, has been advanced to chief of the automotive engineering division.

JOSEPH AUGUST

E. C. HUGHES

Dr. E. C. Hughes, former chief of the chemical and physical research laboratory, has been promoted to the newly created position of research manager.

R. M. Dugan, former division geologist with Continental Oil Co. at Ventura, Calif., has been appointed division geologist for Conoco's southern region offshore marine department.

Dr. R. O. Norris has been named laboratory director of Petty's Island Laboratory in New Jersey by Cities Service Research & Development Co. Norris succeeds **Dr. R. D. Kleene,** who has resigned.

Samuel B. Lisle has been promoted to head mechanical engineer at Oklahoma City by Sohio Petroleum Co. Before his advancement, Lisle had been serving as senior engineer in the mechanical engineering section.

Gordon West has joined Taylor Oil & Gas Co. at Abilene, Tex., as drilling and production superintendent of the firm's West Texas division. **John Ryan,** formerly with Murphy Corp. at Midland, Tex., has joined Taylor Oil & Gas as district geologist at Midland.

Hugh E. McDonald, vice president of Hi-Way Refineries, Ltd., has retired. McDonald joined Hi-Way in 1937 and became a director and vice president in 1946.

Roland F. Cowley, formerly treasurer of Trans-Tex Drilling Co., Longview, Tex., has been named assistant to the president of the company.

Fred F. Florence of Dallas and **Kay Kimbell** of Fort Worth have been elected directors of Chickasha Cotton Oil Co.

T. J. Jeffrey has joined James A. Lewis Engineering, Inc., of Dallas. Before joining Lewis, Jeffrey was regional engineer with Atlantic Refining Co. in Tulsa.

G. D. Butterworth has been appointed head engineer of project engineering in the general engineering department by Standard Oil Co. (Ind.). Butterworth, a graduate in chemical engineering from the University of Oklahoma, joined Standard Indiana in 1944 as a chemist at the Sugar Creek, Mo., refinery.

Collis P. Chandler, Jr., has been elected chairman of the Kansas chapter of American Association of Oilwell Drilling Contractors. Chandler is associated with Musgrove Petroleum Corp. in Wichita. Other officers elected are: **W. A. Michaelis, Jr.,** Trans-Era Petroleum, Inc., vice chairman for western Kansas; **Jack Campbell,** R. W. Rine Drilling Co., vice chairman at large; and **Charles M. Powell,** Powell Drilling Co., secretary-treasurer.

S. Z. Natcher, former assistant to the vice president of conservation of Standard Oil Co. of California, has been named resident executive in London, where he will be principally concerned with California Standard's interest in Iran.

J. K. (Keith) Stapleton has been named geologist in charge at Lucky Strike Drilling Co.'s operations on its concession in the Maryborough basin in Australia. Stapleton formerly was with Wilcox Oil Co. and with Goff-Leeper Drilling Co.

G. C. Colwell, general manager of the contract department of Parker Drilling Co., has been elected a director of the firm. Colwell, who has been in the Tulsa office since last spring, joined Parker more than 8 years ago.

C. J. Wooley, Jr., supervising petroleum engineer in the Southwest Texas division office of Humble Oil & Refining Co., has been transferred to the petroleum engineering division at Houston as supervising petroleum engineer. **J. G. Jackson,** petroleum engineer in the Southwest Texas division office, has been promoted to senior petroleum engineer. **Dandridge W. Marston,** district civil engineer for Kelsey district in the Southwest Texas division, has been transferred to the East Texas division office as senior civil engineer.

DEATHS

H. H. Stubble, a native of Pennsylvania and a veteran drilling contractor in southwestern Ontario, died recently at Chatham, Ont.

Bernard M. Flynn, 56, lubrication engineer for Sinclair Refining Co. at Dallas, died recently in Dallas. Flynn joined Pierce Oil Co. after graduating from college and began 32 years of service with Sinclair when it bought out Pierce in 1922.

Henry M. Brown, 65, former president of Texas-Gulf Producing Co. and founder of Midland Gasoline Co., died recently in a Topeka, Kans., hospital after a year's illness. He retired in 1948, selling his interest in the Midland Co. to Chicago Corp., and Warren Petroleum Corp.

W. R. (Rusty) Wilson, 65, independent operator in Oklahoma and Kansas, died recently in Kansas.

Jorge Cumming, 57, exploration manager for Petroleos Mexicanos, died suddenly October 13 after suffering a heart attack at Acapulco, Mexico, where he was vacationing. Cumming began his career in the oil business after his graduation from University of Mexico in 1922. He became associated with Petroleos Mexicanos in 1939 as general superintendent of fields and terminals in the southern zone. He was later named exploration manager for Pemex. At the time of his death, he was vice president of the Mexican Association of Petroleum Geologists and a member of the South Texas Geological Society.

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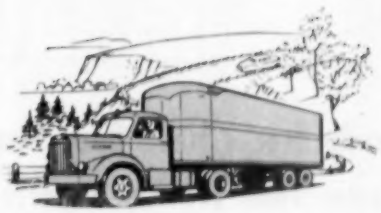

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Name_____

Firm Name_____

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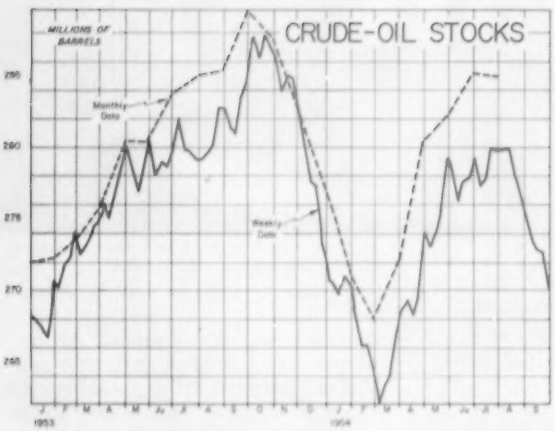
Type of operation_____

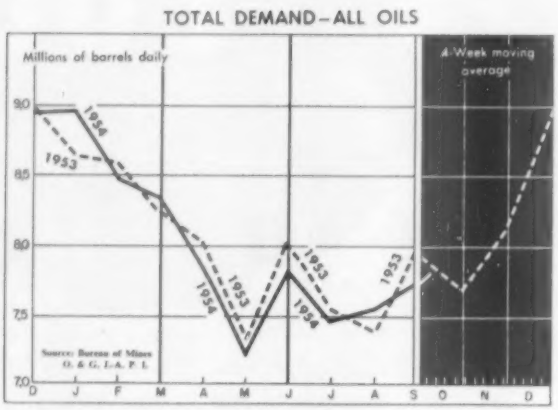
No. of trucks in fleet_____

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,168,425	UP	14,925	DOWN	177,559
Crude stocks	270,084,000	DOWN	2,490,000	DOWN	17,684,000
Completions	1,090	UP	210	UP	31
Refinery runs	6,711,000	DOWN	268,000	DOWN	230,000
Gasoline stocks	151,550,000	DOWN	568,000	UP	11,263,000
Four-product stocks	377,282,000	UP	2,573,000	UP	17,468,000
Total imports	1,325,700	UP	486,500	UP	305,500




TOTAL DEMAND—ALL OILS
Millions of barrels daily
4-Week moving average
1954
1953
Source: Bureau of Mines
O. & G. J.—A. P. I.
D J F M A M J J A S O N D

Crude Stocks Have Been Dropping Faster Than Weekly Reports Indicate

WEEKLY crude-oil stock reports show an inventory drop of 9,660,000 bbl. in the past 9 weeks, but other weekly data indicate that the stock reduction was even larger.

For the past 2 years, crude-stock totals, reported by the Bureau of Mines on a weekly basis, have fallen well below the final figures reported each month by that agency.

The above chart shows that the weekly figures at the beginning of the year were about 5,000,000 bbl. less than the figures from the monthly report. This weekly-monthly difference has ranged from 500,000 bbl. at the end of January to about 6,000,000 bbl. at the end of April. On July 31 the total shown on the monthly report was 5,000,000 bbl. more than the weekly figure for that date.

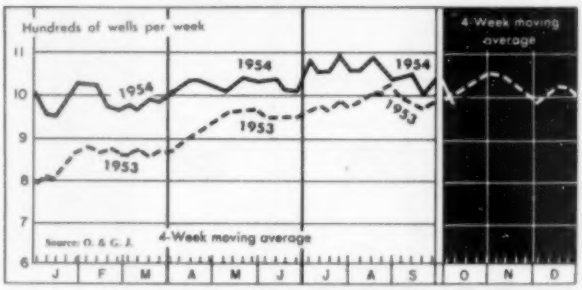
Foreign stocks accounted for only 945,000 bbl. of the total crude-stock decrease in the 9-week period, and weekly reports of runs and imports show a good foreign crude balance when combined with the reported stock reduction.

Refinery runs of domestic crude for the 9-week period totaled 504,810,000 bbl., according to the weekly A.P.I. reports. Crude exports, transfers, and loss were estimated at 6,860,000 bbl. to account for 511,672,000 bbl. of crude during the period. Production of crude and lease condensate amounted to 499,230,000 bbl., leaving a total of 12,440,000 to be supplied from domestic crude in storage.

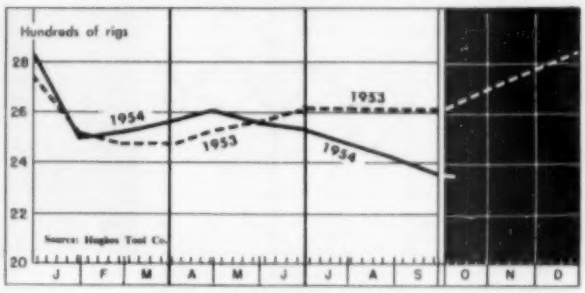
When this reduction in domestic stocks is added to the drop of 945,000 bbl. in foreign crude, total crude reduction for the period becomes 13,385,000 bbl. compared with the decrease of 9,660,000 bbl. from the weekly crude-stock reports.

If the weekly figures on production and runs are reasonably accurate, the spread between weekly and monthly reports of crude stocks has dropped to less than 1,500,000 bbl.

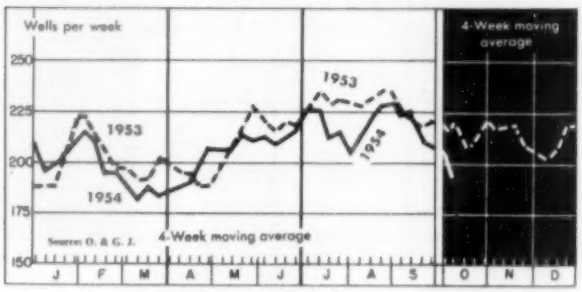
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

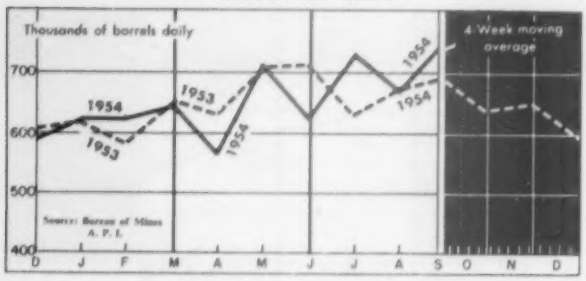
Area—	10-11-54	Change from 10-4-54	Change from 10-12-53
Gulf Coast	503	9	— 72
N. and W. Texas-New Mexico	732	— 6	— 83
Arkansas-N. Louisiana-E. Texas	165	— 7	— 25
Oklahoma	294	26	— 59
Kansas-S. Nebraska	139	—15	— 24
Illinois-Eastern	151	3	— 2
Rocky Mountain	245	—13	— 43
Pacific Coast	132		— 34
Total United States	2,361	— 3	—342
Western Canada	146	11	— 31

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 9, 1954

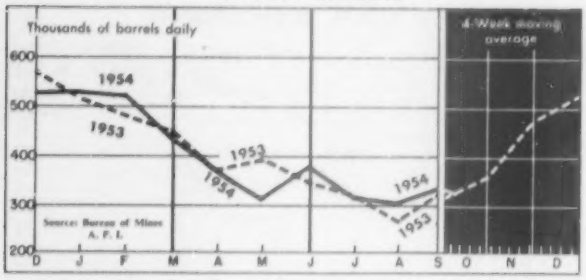
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	2	0	0	2	15,822	86	114	0	0	0	2	2	2	0	2	75	79
Arkansas	6	4	0	2	19,137	501	422	0	0	0	1	1	20	0	4	96	120
California	42	29	1	12	189,154	1,830	2,002	1	0	0	8	9	48	1	10	398	457
Colorado	32	9	2	21	165,367	1,018	540	0	0	1	18	19	28	0	15	416	459
Illinois	47	29	0	18	115,185	2,192	1,517	0	0	0	0	0	8	0	0	233	241
Indiana	14	3	1	10	19,409	611	1,000	1	0	1	3	5	8	0	1	110	119
Kansas	108	42	12	54	350,580	3,549	3,797	3	0	2	14	19	64	0	20	472	556
Kentucky	26	5	7	14	46,253	875	865	0	0	0	4	4	14	0	3	93	110
Louisiana	68	45	4	19	326,548	2,720	2,071	1	1	0	4	6	86	45	29	266	426
North	49	36	3	10	134,822	1,508	889	1	0	0	1	2	14	3	11	111	139
South	19	9	1	9	191,726	1,212	1,182	0	1	0	3	4	72	42	18	155	287
Michigan	10	5	0	5	37,777	430	465	0	0	0	3	3	13	0	0	159	172
Mississippi	8	4	0	4	53,282	318	286	0	0	0	3	3	9	1	0	115	125
Montana	6	3	0	3	21,475	250	334	0	0	0	2	2	4	0	2	83	89
Nebraska	8	4	0	4	45,964	331	258	2	0	0	3	5	21	0	3	101	125
New Mexico	24	12	9	3	119,875	836	1,107	0	0	0	1	1	13	0	15	84	112
North Dakota	11	7	0	4	83,831	234	200	0	0	0	3	3	4	0	0	86	90
Ohio	12	3	3	6	19,187	883	841	0	0	0	0	0	3	0	5	13	21
Oklahoma	161	95	16	*50	553,431	7,039	5,814	6	0	1	9	16	98	3	21	515	637
Pennsylvania-New York	37	10	11	†16	142,916	1,798	2,043	0	0	0	3	3	0	0	6	33	39
Texas	420	260	22	138	1,737,830	14,367	13,309	14	2	0	76	92	622	61	137	3,249	4,069
Southwest (1 & 4)	41	22	5	14	146,325	2,040	2,149	1	0	0	7	8	89	24	38	555	706
Gulf Coast (2 & 3)	66	35	0	31	417,256	2,080	1,931	1	2	0	17	20	65	31	41	525	662
East (5 & 6)	27	10	4	13	141,816	752	619	1	0	0	8	9	13	0	13	229	255
North Central (7-B & 9)	184	115	0	69	533,360	5,390	5,055	7	0	0	35	42	282	4	18	1,304	1,608
West (7-C & 8)	75	64	1	10	412,881	3,322	2,935	3	0	0	8	11	169	0	19	566	754
Panhandle (10)	27	14	12	1	86,192	783	620	1	0	0	1	2	4	2	8	70	84
Utah	6	0	0	6	5,301	63	50	0	0	0	4	4	3	0	1	36	40
West Virginia	13	2	10	1	40,534	467	470	0	0	1	1	2	0	0	25	15	40
Wyoming	29	21	0	8	173,503	991	600	0	0	0	6	6	30	0	6	151	187
Miscellaneous	0	0	0	0	0	97	67	0	0	0	0	0	3	0	0	28	31
Total United States	1,090	592	98	400	4,282,361	41,486	38,172	28	3	6	168	205	1,101	111	305	6,827	8,344
Total previous week	880	488	52	340	3,395,987			19	1	5	143	168	1,073	108	299	6,659	8,139
Total October 10, 1953	1,059	549	84	426	4,112,377			34	4	9	204	251	1,146	85	291	7,100	8,622

Service wells included: *4, †8.

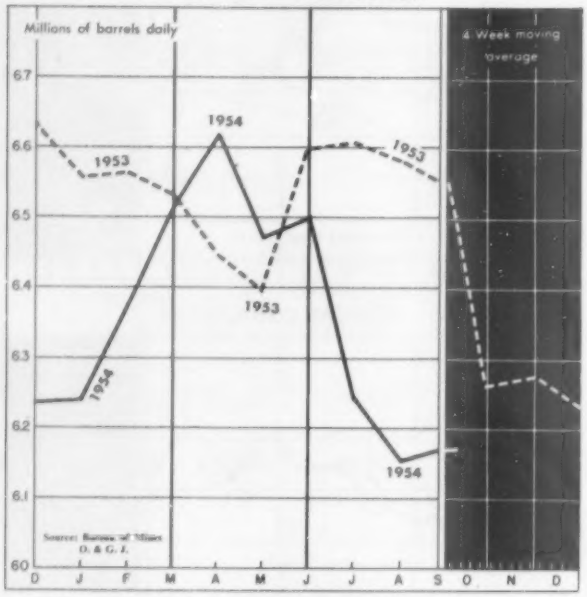
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

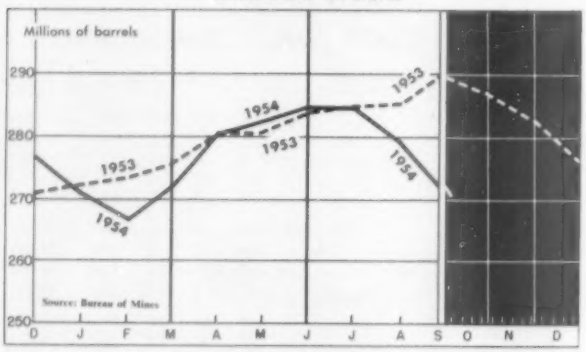


DAILY AVERAGE PRODUCTION FOR WEEK

	October 9			Oct. 2
	Crude oil	Lease condensate	Total	total
Alabama	4,100		4,100	4,100
Arkansas	76,300	500	76,800	77,200
California	968,200		968,200	958,300
Colorado	134,500		134,500	132,300
Eastern	53,500		53,500	53,800
Florida	1,575		1,575	1,525
Illinois	184,400		184,400	181,300
Indiana	27,600		27,600	27,900
Kansas	313,400		313,400	316,700
Kentucky	37,100		37,100	37,600
Louisiana	583,700	41,600	625,300	622,175
North	103,700	2,600	106,300	106,900
South	480,000	39,000	519,000	515,275
Michigan	31,000		31,000	33,000
Mississippi	88,400	3,000	91,400	91,000
Montana	39,800		39,800	39,700
Nebraska	19,600		19,600	19,300
New Mexico	204,425	2,250	206,675	207,350
Oklahoma	480,800		480,800	465,600
Texas	2,550,000	47,575	2,597,575	2,609,750
Dist. 1	42,400	400	42,800	42,375
Dist. 2	129,500	7,550	137,050	136,375
Dist. 3	398,800	22,300	421,100	425,550
Dist. 4	226,000	5,300	231,300	230,950
Dist. 5	42,500	425	42,925	43,775
Dist. 6	107,000	4,600	111,600	113,325
East Texas field	203,800		203,800	208,700
Dist. 7-B	134,000	25	134,025	134,025
Dist. 7-C	171,000	4,600	175,600	176,450
Dist. 8	820,000	2,000	822,000	831,425
Dist. 9	188,000	350	188,350	182,350
Dist. 10	87,000	25	87,025	84,450
Utah	5,300		5,300	4,400
Wyoming	254,600		254,600	255,800
North Dakota	14,900		14,900	14,700
Miscellaneous	‡300		‡300	
Total U. S.	6,073,500	94,925	**6,168,425**	6,153,500
Change from previous week, up			**14,925**	
Canada	†253,800		†253,800	†290,000
Total U. S. production January 1-October 9			1,789,298,025 bbl.	
Same period last year (crude plus cond.)			*1,841,508,665 bbl.	

*Includes 25,576,000 bbl. condensate. †Week ended previous Monday. ‡Included S. D. 100, Nev. 200.

CRUDE-OIL STOCKS



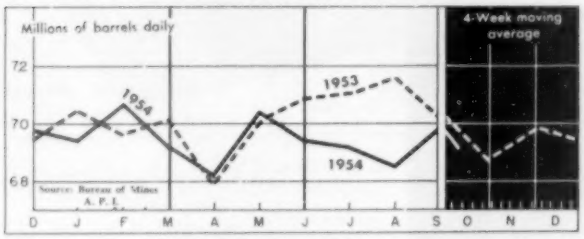
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

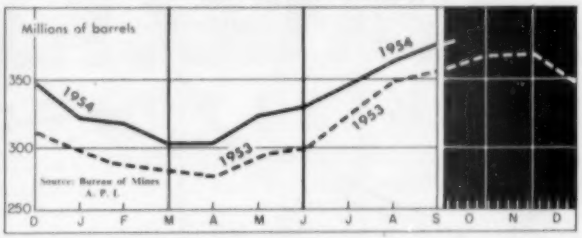
	Oct. 2, '54	Sept. 25, '54	Oct. 3, '53
Pennsylvania Grade	3,091	3,097	2,809
Other Appalachian	1,626	1,501	2,141
Illinois, Indiana, Michigan	13,014	13,007	12,617
Kansas	10,196	9,928	10,794
Oklahoma	24,142	24,880	31,572
Arkansas	3,399	3,371	3,258
Louisiana	15,879	15,840	16,997
North	2,515	2,459	2,699
Gulf	13,364	13,381	14,298
Mississippi	2,890	3,293	3,636
New Mexico	9,353	8,748	9,394
Texas	126,834	127,758	133,460
East Texas proper	10,876	11,257	11,866
West Texas	56,251	56,983	59,377
Texas Gulf	25,115	25,072	28,211
Other Texas	34,592	34,446	34,006
Wyoming	12,644	12,486	13,638
Other Rocky Mountain	4,764	5,005	2,859
California	32,081	32,089	32,947
Foreign	†10,171	11,571	11,646
Total	270,084	272,574	287,768

*Bureau of Mines. †Includes 2,820,000 bbl. in California.

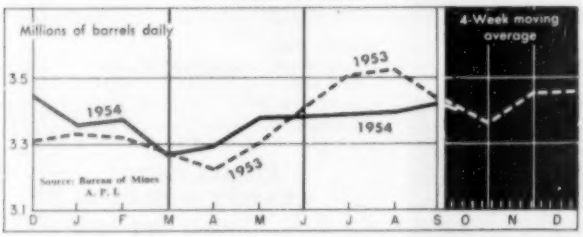
REFINERY RUNS



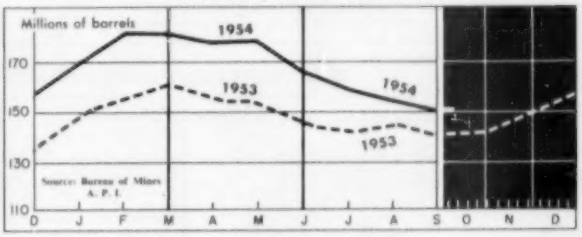
FOUR-PRODUCT STOCKS



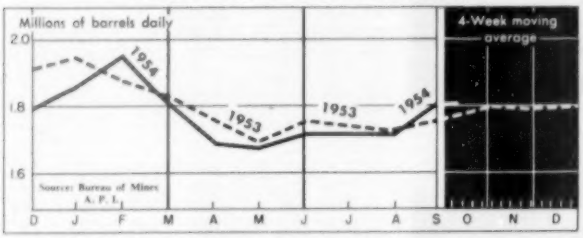
GASOLINE PRODUCTION



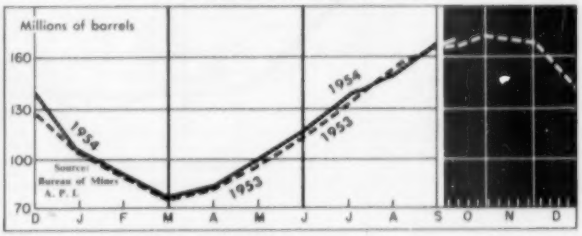
GASOLINE STOCKS



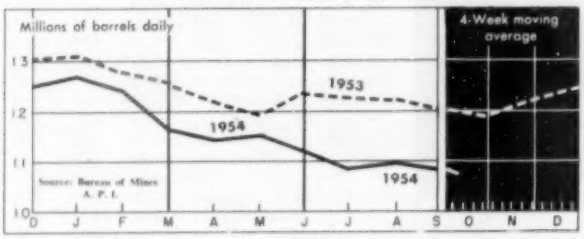
MIDDLE-DISTILLATE PRODUCTION



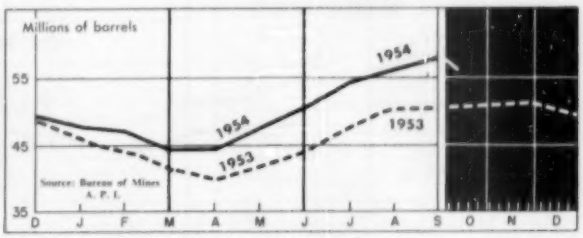
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, OCTOBER 8

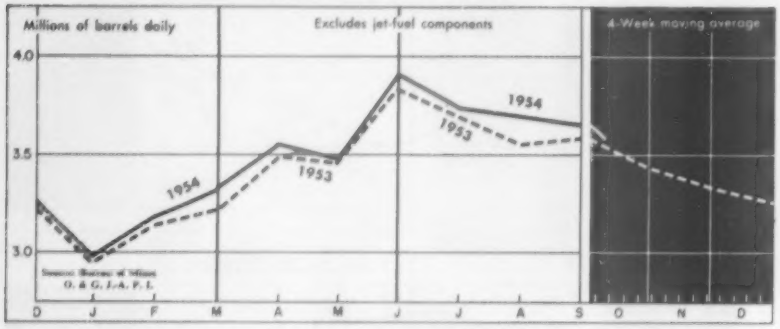
(Excludes all jet-fuel components)

(Thousands of barrels)

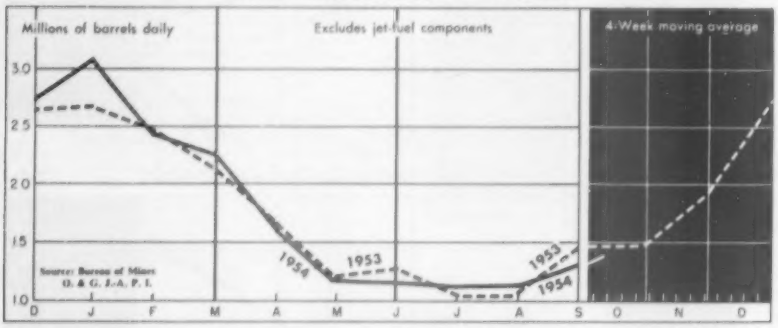
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,003	398.4	18.7	281.1	177.6	35,281	15,474	47,782	10,685	1,009	428.7	33.8	256.1	209.9
Appalachian:														
District 1	95	44.3	6.7	20.1	7.3	4,267	801	2,740	509	109	46.2	6.2	17.1	11.2
District 2	78	37.0	7.7	14.0	5.6	2,205	446	772	331	85	46.2	4.3	13.0	12.5
Ind., Ill., Ky.	1,216	679.4	72.7	236.9	133.8	33,283	9,986	25,928	4,348	1,269	703.2	86.9	224.2	169.4
Okla., Kans., Mo.	588	321.0	18.0	142.3	42.3	14,190	2,420	12,815	1,315	565	330.7	10.6	138.9	49.0
Inland Texas	220	170.3	7.3	44.0	19.6	5,343	341	2,521	1,264	250	180.8	11.7	44.2	29.7
Texas Gulf Coast	1,669	787.7	96.3	396.7	208.7	19,049	4,444	15,913	6,202	1,639	822.9	131.6	383.8	235.0
La. Gulf Coast	593	302.6	42.9	183.3	34.1	9,496	2,930	5,122	1,347	548	273.8	53.5	150.2	43.7
N. La. and Ark.	57	22.4	4.0	18.0	4.9	4,302	1,012	1,450	131	90	38.2	7.2	20.1	7.2
Rocky Mountain:														
New Mexico	17	9.3	.4	3.0	2.4	262		86	33	20	12.6	0.4	3.0	3.9
Other Rocky Mtn.	223	100.6	5.0	53.6	36.3	5,528	256	2,668	849	225	110.4	2.0	52.4	40.7
California	952	431.4	6.7	143.0	329.7	18 344	370	13,401	29,040	1,063	443.3	6.9	159.3	372.2
Oct. 8, 1954	6,711	3,304.4	286.4	1,536.0	1,002.3	151,550	38,480	131,198	56,054	6,872	3,437.0	355.1	1,462.3	1,184.4
Oct. 1, 1954	6,979	3,481.6	309.6	1,489.9	1,129.7	152,118	38,390§	127,836	56,365					
Oct. 10, 1953	6,941	3,354.9	353.0	1,442.9	1,208.6	140,287	37,260	128,926	53,341					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines. §Revised.

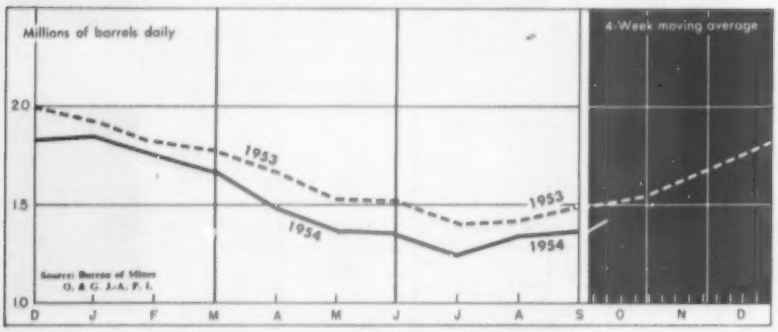
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of October 13, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	10.10	9-9.25
No. 2 straw fuel oil	8.25-8.5	9.35	8.5
No. 6 residual	$1.25-1.35	$2.25-2.35	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Group 3 gasoline prices are netting refiners less than last month without a change in posting. Delivery out of pipeline terminals on a metered gallonage basis will represent a cut in revenue of better than 0.125 cent a gallon when temperatures are low.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 10-8-54	3,405	3,588
July 1954	3,385	3,723
September 1953	3,432	3,579
October 1953	3,359	3,423
Middle distillate:		
Four weeks ended 10-8-54	1,802	1,425
July 1954	1,711	1,106
September 1953	1,745	1,453
October 1953	1,795	1,479
Residual fuel:		
Four weeks ended 10-8-54	1,075	1,414
July 1954	1,089	1,243
September 1953	1,203	1,498
October 1953	1,184	1,521

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87	....	....	....
15-15.9	1.93	....	....	....
16-16.9	1.99	....	....	....
17-17.9	2.05	....	....	....
18-18.9	2.11	....	....	....
19-19.9	2.18	....	....	....
20-20.9	2.24	$2.50	....	$2.37
21-21.9	2.30	2.52	....	2.39
22-22.9	2.37	2.54	....	2.41
23-23.9	2.45	2.56	....	2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9	....	2.76	3.09	2.63
34-34.9	....	2.78	3.11	2.65
35-35.9	....	2.80	3.13	2.67
36-36.9	....	2.82	3.15	2.69
37-37.9	....	2.84	3.17	2.71
38-38.9	....	2.86	3.19	2.73
39-39.9	....	2.88	3.21	2.75
40 and above	....	2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, September 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.23
Middle District	3.15
Southwest Pennsylvania	2.81
West Virginia	2.70
Ohio	2.74
Illinois Basin	2.90-3.02

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$16.00 a column inch one issue . . .
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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

FIVE TYPE 80 COOPER Gas-Engine compressors. Thirty 20-in. stroke compressor cylinders—size 5½ in. to 26 in. Pressures to 1,000 lbs. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

HIGH PRESSURE EXCHANGERS: 56 new GRISCOM-RUSSELL CSS-248 twin G-FIN sections, with 1½" 4000 p.s.i. W.P. steel tubes and 3½" 1500 p.s.i. steel shells. Connections are beveled for welding. Surplus prices. Available immediately. Please contact MALONEY-CRAWFORD. Box 659, Tulsa, Phone 3-6234.

FOR SALE: 3600' 4½" extra hole drill pipe, good for shallow drilling, $.90 per foot. Terms. Melton Supply Company, Box 1360, Seminole, Okla.

FOR SALE—In Seminole Area 8—10' x 40' riveted and welded horizontal gasolene storage tanks. Cities Service Oil. Patridge, Bartlesville, Oklahoma.

AUTOMATIC PIPE & TUBING Straightening Machine, 1" to 8⅝" inclusive turns out perfect job in half the time, bargain. Ph. ME 2-1373, P. O. Box 724, Okla. City.

ROTARY RIG COMPLETE: 2,500 to 5,000 ft. capacity. Easily Portable. 4½-in. drill pipe. Double derrick, 7-ft. substructure, Model "S" Cardwell drawworks, 14-in. Gardner-Denver pump powered by LRO Waukesha. Located Grady County, Okla. R. V. Dillard, Phone 1177 or write Box 992, Duncan, Okla.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

Stop Tong Breakage!

ARMITE DRILL COLLAR & TOOL JOINT COMPOUND

ARMITE LABS., 6008 Broad St., Los Angeles 1, Calif.
Petro. Industries Consultants, C.A. Caracas, Venez.

FOR SALE EQUIPMENT

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE—In Lindsay, Oklahoma field, 7—high 500 bbl. erected flat seam used bolted steel tanks. Price $350.00 each, as is. Contact T. P. Mace, ME 6-3331, Oklahoma City. Cities Service Oil. Patridge, Bartlesville, Oklahoma.

FOR SALE—Motorola two-way radio system for Petroleum industry complete with two base stations, 1 set for drilling rig complete with generator and antenna, two 6-volt mobile units and one 12-volt mobile unit. This equipment is in perfect condition just one year old. Will sell at discount. Contact Wycoff Drilling Company, Oakley, Kansas.

COMPLETE RIG: New U-15 Drawworks with four 250 Horse Power Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure. 8,000 Ft. 4½" Drill Pipe, 14 new 7" O.D. x 2⅞" Bore Drill Collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 8,000-foot well in Rocky Mountain area. Inventory on request. Box H-403, The Oil and Gas Journal, Tulsa, Oklahoma.

USED EQUIPMENT

Franks East Texas Unit, mounted on K-10 International Truck. Located in Seminole area.

Franks Model 65/44 DTRD Double Drum Trailer Mounted Workover and Drilling Rig. Serial 1327 96', 150,000# Telescoping Derrick. Located at Alice, Texas.

Franks 7000 Single Drum Skid Swabbing Unit mounted on Dodge Tandem Truck. Located Odessa, Texas.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Franks Super Senior Well Servicing unit 8 x 10 x 62 Single Pole Mast mounted on Tandem International Truck, Located Seminole, Oklahoma.

Write, wire or call Franks Mfg. Corporation, Box 3218, Whittier Station. Tulsa, Oklahoma.

FOR SALE EQUIPMENT

FOR SALE: Sullivan 300 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126 Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses, 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

WATER FLOOD EQUIPMENT located near Norris City, Illinois. One water softener consisting of one CBZ-175 accelerator mechanism complete with 14 feet x 13 feet welded steel tank, one No. 72 Forced Draft Aerator, two motor driven centrifugal pumps, two 9-D chemical feeders, two No. 1 suction boxes and miscellaneous fittings. Shell Oil Company, Centralia, Illinois.

FOR SALE 5500' RIG

Bethlehem "BREEZE" 17½" Rotary with 87' Cantilever Mast, Waukesha WAKE Power Unit, Torque Converter Gardner-Denver 14" mud pump, DV4A Hinderliter Blowout Preventer. Fully equipped with 6 drill collars and 4900' of 4½" drill pipe, 5 KW light plant. Less than 30,000 feet of hole drilled.

Also 3500' Emsco Rig with 84' tubular derrick, 12" mud pump, 3 drill collar and 3000' of 3½" EUE drill pipe.

HUBERT E. BALE
Rodgers Bldg., 6730 Snider Plaza
Phone: LOgan 8597 Dallas 5, Texas

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FOR SALE
BETHLEHEM MC-650 RIG

Available for immediate delivery; located West Texas; MC-650 Drawworks with 3-engine chain compound; 3 Waukesha LRO engines; Bethlehem 350-ton derrick equipment; Bethlehem pumps, rotary table, etc. 136' standard derrick, Shaffer Blowout Preventer, rig up items, etc. Bargain for quick sale.

BOX H-461, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FOR SALE, used Tex-Steamers, one twenty horsepower gas fired, two forty horsepower oil fired. For details write Tex-steam Corporation, P. O. Box 9127, Houston 11, Texas.

NEW HD5 ALLIS-CHALMERS Tracto Shovel with 1¼ yard bucket, used TD14 International Tractor with 8' Bucyrus Hydraulic Dozer, HD7 Allis-Chalmers Tractor with Baker 9' Dozer, 212 Caterpillar Motor Grader, 1951 2 Ton GMC Truck with Loboy Trailer and Everett Ditcher mounted on a Ferguson Tractor. This equipment is all in excellent condition. Contact by phone, Midland, Texas, 2-4743, or write Route 1, Box 47C.

U-15 WITH hydromatic brakes, powered by four 250 Horse Power Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars. Oilwell 14P pump, mechanical Shaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Box H-405, The Oil and Gas Journal, Tulsa, Oklahoma.

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

WILSON GIANT—$6,000: 2—Waukesha 145 GK engines in good condition; rig used for work-over. Includes Kelco spinning and Foster Breakout Catheads; pump drive and rotary drive. Call Madison 1923, Houston or Amhert 7-3311, Wichita, or write P. O. Box 2001, Wichita, Kansas.

FOR SALE: Franks SAL 6000, recently overhauled, also new drilling line and brake blocks installed; Franks 96 foot mast; 3—200 HP Cummins Diesels in good shape with V-belt compound; 7½" x 16" Gardner-Denver pump, 8' flywheel; 4' substructure; 6400' of 3½" IF drill pipe; 6 brand new drill collars and three old ones; one 8x5x29' steel mud tank; steel dog house; steel pipe racks; and jets, wrenches, etc. Rig can be seen 6 miles north and three miles west of Ordway, Colo. Contact DeVere Robinson, Salt Lake City, Utah. Phone 7-0049 or write 1940 S. 11th E.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

FOR SALE:

Bucyrus-Erie 24-L Drilling Rig, fully equipped with tools, Spang Bits, Kohler light plant, new drilling line and Sand line. Rig is 2 years old and in top condition. See this rig before you buy.

Phone 545,
Nowata, Oklahoma

EQUIPMENT WANTED

CAST IRON PIPE, fittings, H. E. Gate Valves, new or used. Advise price and quantity first letter. R. E. Kershaw, P. O. Box 944, Muskogee, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WE PAY THE MOST for Used Line pipe, used casing, abandoned leases. Gore Oil Field Supplies, Box 1063, Tulsa, Okla.

CONTINUOUS PROFITABLE work for one medium rotary rig for share in profit. Box H-458, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co. Box 2603, Tulsa, Okla. $5.00 cash.

GEOLOGIST OF OUTSTANDING ability with at least three years' experience, including northern Louisiana area. Exceptional opportunity in Dallas office of established independent oil concern. Outline experience and personal history. P. O. Box 2775, Dallas, Texas.

YOUNG OIL TAX ACCOUNTANT, preferably with college and some experience, to work in New Mexico. Good opportunity for someone not afraid to work, who is congenial and will assume varied responsibilities. Reply should include details, references and starting salary expected. Box H-463, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$6,000 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 434 Frick Bldg., Pittsburgh 19, Pa.

HELP WANTED

REFINERY SUPERINTENDENT. Chemical or mechanical engineer, under 40 with 10 years' experience in natural gasoline plant and refinery topping operation, to supervise modern plant recently constructed in Ecuador, South America. Knowledge of Spanish advantageous. Reply by letter, enclosing snapshot and full details of experience and education, to Manabi Exploration Company, Inc., 1615 Bank of Commerce Building, Houston, Texas.

WANTED: Distributor for Gas Lift equipment in Louisiana. Two territories now open are Shreveport area and Lafayette area. Prefer Engineering background but will give consideration to experience. Macco Oil Tool Co., Inc., P. O. Box 7288, Houston 8, Texas.

WANTED

Professor of Petroleum Refining and Professor of Geology, Bucaramanga University in Colombia. Contract for 2 years or longer. Requisites: Knowledge of Spanish, teaching and practical experience. Advanced degrees. M.S. minimum.

Box H-464, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

An Able Refinery Manager for Middle East Country

Excellent Compensation
3 - 5 Year Contract with Liberal Provisions

We are seeking a man 40-55 years of age (perhaps older) with experience and fully capable of managing a 25,000 b.p.d. oil refinery located in Middle Eastern country. He must be able to assume full responsibility for the successful operation of this new refinery. Will have freedom to select American personnel needed for other top positions but over the years he will be expected to develop local people for as many key positions as possible. No oil company is involved as this operation is owned by the foreign government who will make a liberal contract with excellent compensation. Location and housing desirable. Because of tax advantages, this is attractive to an older, experienced man who would like to work for five or more years longer or for a younger, experienced man who would like a stimulating career. Please give complete details and personal history.

BOX H-456, THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA

BRAZIL
PETROLEUM REFINERY
SANTOS, BRAZIL

REFINERY MANAGERS—experienced all phases modern refinery practices, including operations & maintenance.

CONTROL CHEMIST—set up & organize Products Control & Inspection Laboratory & train personnel.

YIELDS & COSTS ACCOUNTANT—set up Yields & Costs Department & train personnel.

SAFETY ENGINEER—set up & organize Safety Department & train & instruct personnel in use of safety & fire protection equipment.

OPERATORS—with responsibility similar to shift foreman, experienced on thermal cracking units.

Above personnel will assist in operating & train & instruct Brazilian personnel in operations of a new 45,000 BPD petroleum refinery producing gasoline, diesel & heavy fuels by thermal cracking & catalytic polymerization.

Challenging opportunity for 18 to 24 months foreign employment. Excellent base salary plus living allowance & production bonus, & exemption from income tax for continuous 17 months foreign residence. Wives and minor dependent children may join personnel in Brazil at our expense.

Interviews arranged at our expense on basis of confidential complete chronological resume, including education & employment (names & addresses of employers, dates employed, positions held & scope of responsibility, salaries received, location & type of jobs, etc.). Airmail data to—

PERSONNEL DEPARTMENT

HYDROCARBON RESEARCH, INC.

115 BROADWAY NEW YORK 6, N. Y.

HELP WANTED

PHYSICAL CHEMIST or Physicist, Continental Oil Company, Ponca City, Oklahoma. Immediate opening for physical chemist or physicist. Advanced degree, Ph.D. preferred. Research work in Petrophysics group, Production Research Division. New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

GEOLOGIST—Senior Research, to work in New York. Applicant should have advanced degree and broad experience in petroleum geology, foreign and domestic. Work involves compilation of geological data, evaluation of foreign petroleum prospects and preparation of reports. Important petroleum organization offers this position of responsibility and appeal to the right party. Pay commensurate with education and experience. Age range, preferably 35 to 50. Submit resume in detail. Box H-417, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Manufacturers representatives with good following calling on Oil Producers and Supply Stores to represent Manufacturer of the Hunter Flex-Seal oil well pump plunger and packing means for same. Wants Commission Sales Representatives for following territories. Kansas, Northwest Texas, Oklahoma, Mississippi, and New Mexico. Please give details concerning present Sales Coverage first letter. All replies confidential. W. H. Hunter Engineering Company, 150 Marlborough Dr., Pontiac 19, Michigan.

PETROLEUM ENGINEER, 4 or 5 years experience with emphasis on valuation and Reservoir Engineering. Must be free to travel with Dallas as headquarters. Initial letter application should set out past experience in detail, education and salary requirements. Box H-465, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 79

ARABIAN AMERICAN OIL CO.

505 Park Avenue, New York 22, N. Y.

SITUATIONS WANTED

LANDMAN—27, family, seven years experience in scouting and land departments of major oil company. Desire change. Willing to relocate. Box H-467, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Six years experience in South and East Texas, desires immediate connection with active company. 1628 North Boston, Tulsa, Okla.

ENGINEERING EXECUTIVE — Chemical engineer with 22 years broad experience in Petroleum refining covering Process design, development, licensing, economics, sales, construction and operation, seeks connection with aggressive, expanding corporation engaged in or serving Petroleum refining or Petrochemical fields. Box H-450, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 10 years varied production, drilling and management experience. Desires responsible position with independent or individual. Box H-466, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MR. PRESIDENT:

Why not concentrate on operations and let me assume responsibility for finance and accounting? Have experience in all phases of Oil industry including ten years as Controller, Treasurer, Financial Vice President and Director. Have B.C.S. Degree and am qualified to reorganize accounting personnel and procedures if necessary. Will invest in progressive Company. Box H-459, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—BBA degree accounting major familiar with drilling, production, joint interest, taxes, land and lease work, desires connection with independent. Capable of full charge of office. Age 45. W. R. Andrews, 128 Main Plaza, San Antonio, Texas.

CONSTRUCTION SUPERINTENDENT: Twenty years experience in supervision, all phases processing plant and pipeline station construction with major engineer-constructors. Mechanical Engineering degree. Box H-453, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited.

Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY

P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.

146 Allen Building, Midland, Texas,
Phone 2-2962.

REAL ESTATE

3,000 ACRES, 2 miles private water, large pecan trees along creek. Good hunting and fishing, a beautiful place. Other ranches and farms from small acreage to 13,000 acres. Write: Street Hamilton, 117 Main, Kerrville, Texas.

CONCRETE AND STEEL BLDG., 5000 square ft. with 70,000 ft. yard space on S.E. 29 St., Okla. City for oil field supplies. Manufacturing or any industry. Inlet and outlet from 3 directions. Bargain for quick sale. Ph. ME 2-1373, P. O. Box 724, Okla. City.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

OIL FORMS

KRAFTBILT FORMS, designed especially for the oil industry, are popular because they are efficient, economical. For all production-reporting forms, plat sheets, all administrative forms, columnar pads, truck reports, material transfer forms, ask for Catalog 854-K. Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

BUSINESS OPPORTUNITY

Business Opportunity

We have 8500-foot rig in excellent condition, Ideco No. 700, now drilling first of eight consecutive wells in proven area. Will sell rig priced right and in addition give balance of eight consecutive contracts on profitable basis. Address reply to Box H-457, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

WANTED PRODUCTION or Producing Royalties, Oil or Gas. From Principal to Purchaser. Submit full particulars, payments, engineering reports, etc. Box H-455, The Oil and Gas Journal, Tulsa, Oklahoma.

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg. Tulsa, Okla.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

2000 ACRES OF LEASE in old Somerset Field of Atascosa County, Texas. Thirty feet of sand. Low withdrawal to date. High residual in place. Good possibilities for secondary recovery. 1500' depth. Texas Drillers, Inc., P. O. Box 948, Seguin, Texas.

FOR LEASE: 9 acre tract of land located at the edge of Peoria, Illinois. This property is located on a railroad and good highway. Zoned for heavy industry, will lease part or all of this tract. Box H-468, The Oil and Gas Journal, Tulsa, Oklahoma.

160 ACRES Departmental lease, 7 years to run. $1.25 rentals, never drilled, pipeline on lease, ½ south, ½ west, originally 1,000 bbl. well, $5.00 acre. L. Price, Coweta, Okla.

160 ACRE LEASE. Okmulgee county with discovery well, fully equipped. Jno. T. Buckley, 5107 Avenue G, Austin, Texas.

PRODUCTION DEAL, New Pool, Well drilled, Schlumberger log, two oil sands, 1480-1820, 640 acre block. Need operator to finish well and drill block. Or $8000 tax money and will set pipe and in tanks. Box 106, Seminole, Oklahoma, Phone 1258.

RECENTLY ORGANIZED group seeking drilling deals accompanied by complete geological reports. Box H-423, The Oil and Gas Journal, Tulsa, Oklahoma.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

KANSAS WATER FLOOD oil lease for sale, has 1200 acres, five wells plus water wells, Gaso pressure pump, tanks and other equipment, owner Mr. O'Chamis, Tioga Hotel, Chanute, Kansas.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis, Mo.

PRODUCTION WANTED

NEWLY ORGANIZED syndicate wants to buy 5,000 to 30,000 barrels oil monthly production. You will deal direct with principals. Prompt action. Evaluation report must accompany submittal. Box H-422, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP STICKS

KRAFTBILT ALL-PLASTIC SNAP-ON MAP STICKS: Light-weight resilient plastic clips snap maps to sticks in seconds—eliminate rolled map-handling problems. Bright colored Index Flags—plugged in one end of sticks, carry labeled identity and instantly "flag" the maps you want. Send for Catalog 352-A. Ross-Martin Co., P.O. Box 800-A, Tulsa, Okla.

WILDCAT COMPLETIONS

(Continued from page 194)

SW 27-44n-93w. Dry. TD 4,845 ft. Tensleep.

Natrona County: M.K.M. Oil Co. 1 Roach, NW SE NE 25-37n-80w. Dry. TD 5,790 ft. Morrison.

Sublette County, Tip Top Unit: General Petroleum Corp. 73-X-30 Greenburg NW SE NE 30-29n-113w. Dry. TD 3,520 ft. Baxter.

Washakie County, Mud Gulch: Atlantic Refining Co. 1 Government-Schrodermier, SE NE NE 8-45n-88w. Dry. TD 5,715 ft. Tensleep.

UTAH

Grand County: W. D. Broadhead 1 State-Catterson, SW NW 20-21s-24e. Suspended. TD 565 ft.

Bill Bush 1 State-Hosey, NE SE SE 26-21s-23e. Suspended. TD 920 ft.

South Cisco: G. K. Industries 1 State, C S½ 29-21s-24e. Suspended. TD 1,102 ft. Entrada.

Cisco: William D. Hewit 1 Government, SE SW NE 23-21s-23e. Dry. TD 1,163 ft. Entrada.

COLORADO

Adams County: C. L. Manning 1 Tillie & Fahk, C SW SW 4-2s-57w. Dry. TD 5,770 ft.

Archuleta County: Stanolind Oil & Gas Co. 1 Bixler Gas Unit, W½ NE SW 14-32n-6w. IP 279 M.c.f. of gas per day, Pictured Cliffs discovery, new field. TD 5,332 ft. Point Lookout.

Logan County: H. C. Arnold and Calvert Drilling Co. 1 Martens, SW NW NE 13-7n-55w. Dry. TD 5,525 ft.

Fallon Gas Co.-New World Oil Co.-W. F. Lacey et al 1 UPRR, NE SW SE 23-12n-53w. Dry. TD 5,361 ft.

Goff-Leeper Drilling Co. 1 Byrd et al, SE SE SE 26-9n-55w. Dry. TD 5,504 ft.

Kansas-Nebraska Natural Gas Co. 1 Hughbanks, C NW SE 12-7n-55w. Dry. TD 5,526 ft.

Mesa County: Phillips Petroleum Co. 1 Pray Government, Debeque area, SE SE NW 31-8s-98w. Dry. TD 3,500 ft. Mancos.

Morgan County: Aurora-Kingwood-Lion 1 Colby, SW SW SE 20-5n-56w. Dry. TD 5,692 ft.

H. L. Hunt 3 Geo. E. Huey et al, C NE SE 25-2n-57w. Dry. TD 5,390 ft.

Washington County: Barnes & Brown-Warren Petroleum Corp.-H. E. Zoller 1 Claypool, SW SW NW 3-2s-49w. Dry. TD 4,020 ft.

Claycomb & Guida 1 Bowen, SE NE SW 8-2n-53w. Dry. TD 5,050 ft.

Claycomb & Guida 1 Horn Bros., C SW NW 31-2n-53w. Dry. TD 4,959 ft.

R. L. Manning 1 Officer, C SE NE 28-2s-55w. Dry. TD 5,028 ft.

C. T. McLaughlin 1 Cawthra, SE NE NE 34-2s-50w. Dry. TD 4,061 ft.

Plains Exploration Co. 1 Asmus, C NW NE 18-2s-55w. Dry. TD 5,112 ft.

Ryan Oil Co.-Davis & Potter Drilling Co. 1 Gilman, C NE NE 35-3s-53w. Dry. TD 4,633 ft.

Weld County: Metz-Desser & Bright-Twin Arrow 1 Government, C NE NE 14-9n-59w. Dry. TD 6,760 ft.

Shell Oil Co. 1 Federal, C NW SE 6-10n-56w. Dry. TD 6,190 ft.

Yuma County: McDannald Oil Co. 1 Seedorf, SE NE NE 32-1s-48w. Dry. TD 3,772 ft. Skull Creek.

EQUIPMENT MEN

Nordberg Names Three To Key Positions

R. MILLER

Appointment of Hans U. Lieberherr as director of engineering, Emil Grieshaber as director of projects development, and Ralph Miller as consultant and director of supairthermal development and application, Heavy Machinery Division, has been announced by Roland W. Bayerlein, vice president, Heavy Machinery Division, Nordberg Manufacturing Co., Milwaukee.

LIEBERHERR

E. GRIESHABER

In 1929 Lieberherr joined Sulzer Bros., in Winterthur, Switzerland, as a designer for double acting two-cycle engines. In 1936 he was named chief engineer in charge of design of navy-type engines for submarines and surface vessels. He continued in this capacity until 1949 when he joined Nordberg as technical representative for Nordberg throughout Europe, establishing headquarters at Paris, France.

Grieshaber joined Usines Carels Freres, Ghent, Belgium, in 1913. He was active in experimentation and development of diesel engines under license granted to Carels by Dr. Rudolph Diesel. In 1915 when it became apparent that Carels would be unable to continue production under German occupation, Grieshaber joined Nordberg. He provided valuable technical assistance in the development of the early diesel engines built by Nordberg. He was later appointed head of the steam engine and compressor department and in 1936 was named chief engineer which position he held until his appointment as director of projects development.

Miller was first employed by De LaVergne Machine Co. Engine design and development work followed with Ingersoll-Rand, Superior Engine Co., American Locomotive Co., and Worthington Corp. In 1945 Miller joined Nordberg as chief engineer in the four-cycle-engine department. His major activity has been in the application of intercooled turbocharged engines and the development of supairthermal engines using the Miller system of turbocharging.

Ensign Carburetor Moves L. G. Smith to Northwest

L. G. Smith has been transferred to the Pacific Northwest, to supervise sales and service activities for Ensign Carburetor Co. in that area. Smith began his career with Ensign in 1938 and has served in almost every division of the company including engineering, manufacturing, service, and sales. During the past 7 years, Smith has been stationed at Lubbock, Tex., serving the company's Mid-Continent territory, supervising installation of Ensign carburetion. He has frequently held carburetion schools attended by many of the oil company personnel.

Managers Named for Le Roi Engine, Compressor Groups

Ray H. Rodolf has been named general manager, compressor division, and Herschel V. Hiatt has been appointed general manager, engine division, as announced by Le Roi Co.'s President T. O. Liebscher.

R. H. RODOLF

H. V. HIATT

Rodolf moves up from the post of sales manager, construction and mining division. He served in that postion for the past year. First employed by Le Roi in 1950, Rodolf served as a West Coast representative. Shortly thereafter he was shifted to the Cleveland division where he became sales manager. Before joining Le Roi, Rodolf was with

Gardner-Denver Co., Chicago, as sales manager of its pump, compressor, and oil-field division.

Hiatt joined Le Roi almost a year ago as director of engineering. Since 1938 he had worked with the Allision Division, General Motors, and before that he was with Warner Corp.

Harmon Named District Manager by Pacific Valves

Howard Harmon has been appointed district manager of the Mid-Continent area with headquarters in Tulsa as recently announced by Pacific Valves, Inc.

Harmon, a well-known figure in the petroleum and chemical industry, was recently secretary of the California Chapter of American Association of Oil Well Drilling Contractors. Prior to this, Harmon managed the New York office of Pacific Valves for many years.

ADVERTISERS IN THIS ISSUE

Ajax Iron Works 46
Allis-Chalmers Mfg. Co. 48, 49
American Cable Division of American Chain & Cable Inside Back Cover
American Chemical Paint Company 188
American Iron & Machine Works Co. 185
American Locomotive Company, Beaumont Plant 13
American Recording Chart Co. 178
Anglo-Iranian Oil Company, Ltd. 169
Appleton Electric Company 22, 23
Autocar Company, The 201
Automatic Sprinkler Corporation of America 162
Baird Mfg. Co. 190
Baker Oil Tools, Inc. 122
Bank of Toronto, The 158
Bethlehem Steel Co. 63
Black, Sivalls & Bryson, Inc. 33
Bower Roller Bearing Company 41
Bristol Company, The 28
Brodie Co., Inc., Ralph N. 44
Buffalo Forge Company 144
Butler Manufacturing Co. 181
Byron Jackson Co. Front Cover
Campbell Chain Company 175
Carbide and Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 51
Chain Belt Co. 137
Chapman Valve Mfg. Co., The 30
Chase Brass & Copper Co. 198
Chicago Bridge & Iron Company 91
Chrysler Corporation, Industrial Engine Division 35
Clark Equipment Company, Construction Machinery Division 45
Classified Advertising 207, 208, 209, 210
Claymont Steel Products Department, Wickwire Spencer Steel Division of The Colorado Fuel and Iron Corporation 32
Connelly, Inc. 133
Coppus Engineering Corp. 3
Core Laboratories, Inc. 164
Crane Co. 148
Crose Manufacturing Co., Inc., M. J. 145
Curtin & Co., W. H. 136
Darling Valve and Mfg. Co. 139
Dean Brothers Pumps, Inc. 185
Delta Engineering Sales Co. 133
Diamond Alkali Company 18
Dowell Incorporated 120
Dresser Manufacturing Division 143
Drilling & Service, Inc. 194
du Pont 57, 58
Eastman Oil Well Survey Company 29
Edward Valves, Inc. 135
Electric Dynamic Division of General Dynamics Corporation 59
Emsco Manufacturing Company 130
Enardo Manufacturing Co. 160
Ethyl Corporation 19, 20
Fairbanks, Morse & Co. 2
Farris Engineering Corp. 6, 7
First National Bank & Trust Co. of Tulsa, The 186
First National Bank of Shreveport, The 163
Fisher Research Lab., Inc. 190
Fleet-Line Co. 140
Fulton & Company, R. H. 138
Fyr-Fyter Co., The 60
Gates Rubber Co., The 212
General American Transportation Corporation 64
General Electric Company 16, 17
Geolograph Company, Inc., The 185
Globe Oil Tools Company 134
Goodrich Chemical Company, B. F. (Hycar) 124
Grancell, I. H. 135
Guiberson Corporation 182
Halliburton Oil Well Cementing Co. 15, 171
Hartwell & Son, Inc., H. N. 183
Howe-Baker Corporation 147
Howell Electric Motors Company 12
Huey & Co., S. E. 140
Hughes Tool Co. Back Cover
Humble Oil & Refining Co. 180
Inferno Co., The 136, 152
Infilco Incorporated 154
International Harvester Co. 128
International Nickel Company, Inc., The 68
Johnston Testers, Inc. 27
Jones & Laughlin Steel Corporation Supply Division 31
Kinzbach Tool Co., Inc. 196
Koehring Company 35
Lane-Wells Company Inside Front Cover
Link-Belt Company 5
Macco Oil Tool Co. 152
Marley Company, Inc., The 61
Mayo Hotel, The 133
Motorola Communications & Electronics Inc., A Subsidiary of Motorola, Inc. 28
Murphy, Frank W. 148
National Airoil Burner Co., The 132
National Bank of Commerce, The 11
National Supply Co., The 42, 43
Nelson Electric Mfg. Co. 141
Nicolet Industries, Inc. 145
Oil and Gas Journal, The 190, 193, 196
Oil Well Supply Division 4
Orbit Valve Company 174
Otis Pressure Control, Inc. 153
Paris Distributor, Inc., Henry H. 192
Parkersburg Rig & Reel Co. 8
Partlow Corporation, The 196
Peerless Pump Division of Food Machinery & Chemical Corporation 150
Peerless Supply Co. Inc. 132
Penrod Drilling Company 173
Petreco, A Division of Petrolite Corporation 38, 39
Petroleum Electric Power Assn. 170
Pittsburgh Plate Glass Company, Industrial Paint Division 25
Precision Radiation Instruments, Inc. 195
Procon Incorporated 47
Quaker Oats Company, The 34
Radio Corporation of America 189
Ratigan, Inc., J. P. 136
Rector Well Equipment Co., Inc. 136
Reda Pump Company 175
Reed Manufacturing Co. 173
Refinery Supply Co., The 141
Reliance Electric and Engineering Co. 187
Republic National Bank of Dallas 40
Republic Rubber Division of Lee Rubber & Tire Corp. 21
Republic Steel Corporation 24
Roebling's Sons Company, John A. 52
Rogers Geophysical Company 54
Seismograph Service Corp. 167
Shand and Jurs Co. 172
Shell Oil Company 191
Snap-On Tools Corporation 155
Spang & Co. 56
Standard Oil Company of Indiana 50
Station Construction Co. 142
Stearns-Roger Mfg. Co., The 10
Steel Forgings, Inc. 140
Tapecoat Company, The 142
Texas Company, The 37
Thomas Flexible Coupling Co. 184
Thompson Tank & Manufacturing Co., Inc. 163
Timken-Detroit Axle Division, Rockwell Spring and Axle Company 176, 177
Timken Roller Bearing Company, Steel and Tube Division 9
Tretolite Company, A Division of Petrolite Corporation 53
Union Carbide and Carbon Corporation, Carbide and Carbon Chemicals Company 51
United States Steel Corporation
Oil Well Supply Division 4
U. S. Steel Supply Division 55
Valley Electric Corp. 168
Victor Products Corp. 132
Visco Products Co., Inc. 119
Wagner Electric Corporation 14
Warren Petroleum Corporation 66
Watson-Stillman Fittings Division H. K. Porter Company, Inc. 126
Wedgeplug Valve Company, Inc. 156
Welex Jet Services Inc. 161
Well Equipment Mfg. Corp. 62

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 152.53 acres of land within the known geologic structure of the Greybull field, undefined, Big Horn County, Wyoming will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., November 10, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Cheyenne, Wyoming, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 128.63 acres of land within the known Geologic structure of the Thornburg Field, Moffat County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., November 17, 1954, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms, may be obtained from the Manager of the Land Office, Denver, Colorado, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that two parcels of land containing 397.19 acres within the known geologic structure of Spring Creek Field in Park County, Wyoming, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., November 3, 1954, when the bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Cheyenne, Wyoming, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.

LEGAL

SEALED BIDS will be received until 2:00 P.M., Mountain Standard Time, November 3, 1954, and opened at that time in the Office of the Superintendent, Blackfeet Indian Agency, Browning, Montana, for the leasing of 36,484.79 acres of Tribal land and 11,835.41 acres of allotted Indian land, located in Glacier and Pondera Counties, Montana, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of the Blackfeet Indian Agency at Browning, Montana, or call the Agency Land Office, phone 2561, Browning. Charles S. Spencer, Superintendent.

to cut your V-Belt costs--

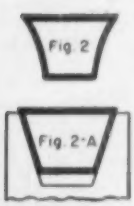
--just make this simple test!

Bend *any* V-Belt that has *straight sides* (Fig. 1). As the belt bends, *feel* the sides *bulge out* (Fig. 1-A). Clearly, the bulging sides are forced to press *unevenly* against the V-pulley—and this *concentrates* the wear at the points shown by arrows (Fig. 1-A). Naturally, this means shorter life for the straight-sided V-Belt.

Now bend the Belt with CONCAVE SIDES...

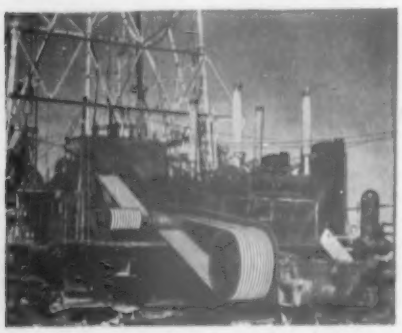
(U.S. PAT. 1813698)

. . . the Gates VULCO ROPE (Fig. 2)



You find that the CONCAVE SIDES *fill out* and become perfectly straight. They thus press *evenly* against the V-pulley (Fig. 2-A). All wear is distributed *uniformly* across the *full width* of the GATES VULCO ROPE—and this means *longer* belt life and *lower* belt costs for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES...the GATES VULCO ROPE!



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C9-940

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Tru-Lay Preformed Wire Rope

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6X19 SEALE On drums, 6x19 Seale takes abrasion, bending, and terrific crushing. On blocks, it stands up against friction and peening. The extra large center wire in each strand and the nine small wires furnish a solid foundation for the nine large diameter outside wires which take an extra lot of wear.

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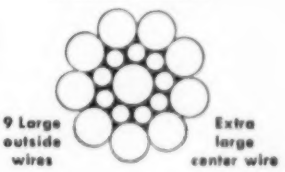

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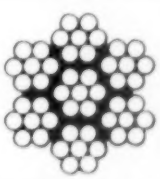
IMPROVED PLOW STEEL I. P. S. means maximum tensile strength. It's the only grade for economical service on rotary drums and high speed sheaves. It has long fatigue life and will run for thousands of miles of heavy travel before wires break and affect the rope's strength.

6X19 SEALE, IPS, IWRC

Diameter	Ton Strength
⅜"	69,200
1"	89,800
1⅛"	113,000
1¼"	138,800
1⅜"	167,000
1½"	197,800

INDEPENDENT WIRE ROPE CORE Only a line with I.W.R.C. will stand up under the strains of cross-overs and overwinding that occur on drums of rotary drilling rigs. I.W.R.C. adds 7½% to the breaking strength of the rope over a hemp core. It also holds proper spacing between strands and prevents nicking.



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